THE PAPER INDUSTRY and PAPER WORLD

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The superior qualities of Stebbins Tanks and Linings for pulp and paper mill service are always apparent, for they save our customers many thousands of dollars a year.

Stebbins Linings are noted throughout the pulp and paper industry for their proper design and composition, accurate and thorough workmanship, corrosion resisting qualities and long life; for they invariably outlive our dependable guarantees.

Large stocks of Stebbins materials – of many shapes, sizes and compositions – as well as the proper bonding cements—are always ready for prompt shipment. Adequate stocks of emergency repair materials are maintained at strategic points in all pulp and paper manufacturing areas and skilled Stebbins mastercraftsmen are always available at a few hours notice for emergency work or new installations.

Our fifty-five years experience is at your service in designing and developing a tank or lining to meet any specific requirements in your own mill.

SEMCO

Stebbins Engineering and Manufacturing Company

WATERTOWN, NEW YORK

ADVERTISING PAGES REMOVED

TRADE WINDS

WIS. MILLS BACK RESEARCH TO STOP STREAM POLLUTION

▸▸▸ TEN WISCONSIN SULPHITE MILLS, representing 90 per cent of the State's sulphite pulp producers, have combined to finance an extensive research program in an attempt to develop methods of eliminating pollution of streams by sulphite liquor. This action is a direct result of the Wisconsin State Board of Health's recent assertion that the pollution in the Fox and Wisconsin Rivers was due to sulphite waste (cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 842, Nov. 1939).

Representatives of the ten mills met at the Institute of Paper Chemistry on November 14 and elected J. M. Conway, president of Hoberg Paper Mills, Inc., Green Bay, as chairman of the resarch committee; C. G. Parker of Kimberly-Clark Corporation as financial trustee, and John Strange, secretary of the Institute of Paper Chemistry, as secretary. The technical work is to be carried on by the Institute.

Considerable interest was manifested in the so-called "Howard process" which has been in experimental use at Rothschild, Wisconsin, and by which sulphite liquor is treated by lime precipitation. This process recovers from 70 to 80 pounds of sulphur and nearly 1,000 pounds of lignin, principally pitch, per ton of pulp, it was pointed out. According to reports the sulphur is used in making fresh acid and the lignin can be burned as fuel or used in the production of vanillin, plastics or tanning agents. It was observed, however, that most of the wood sugars and from 20 to 30 per cent of the lignin are carried out with the waste liquor, resulting in the withdrawal of a large amount of oxygen from the streams and thus creating an offensive odor and making the water unfit for fish life. The oxygen demand of treated sulphite liquor differs little from that of untreated liquor, according to studies made.

It is hoped that as a result of this meeting, the long awaited solution of the waste problem will be solved to the satisfaction of the mills, health authorities, and conservation officials.

HIGHER PRICE ON KRAFT IMPORTS

Warren B. Bullock, Manager of the Import Committee of the American Paper Industry, in a special report to the industry reports that Scandinavian kraft has been increased in price since the war began, and this change in base price is accompanied by higher freights and war risk insurance. An increase in the price of M. G. kraft for the United States of 20 cents per hundred pounds became effective October 20th. Orders will be accepted at a fixed price for not more than 45 days from date of confirmation of order or contract. The price on M. F. bag rolls was not advanced at the time of the increase on M. G. grades. Rigid terms are imposed by Scandinavia on any contracts for delivery in British colonies or possessions, and the usual war clauses are applied on sales to the United States.

Prices for both M. G. and M. F. paper were advanced 15 per cent September 28th, on shipments to most Latin American countries, except Argentine, Brazil, Uruguay and Paraguay. Orders for these markets, as well as for the British possessions are only accepted with the provision that any increase in freights, insurance as well as war risk insurance is at buyer's expense and the terms are cash against documents in Europe or letter of credit, and present prices to these countries are only good for 30 days from date of confirmation.

Under the war regulations of Great Britain, all war risk insurance must be paid to the British Government on sales for export and such war risk insurance is now being considered by American Customs officials to be a part of the export price. The insurance is therefore added to the actual price of the commodity, exactly as a sales tax is included in the dutiable value. All duties on British goods, therefore, are computed at an ad valorum rate on the actual selling price of the merchandise, plus the war risk insurance.

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▸▸▸ ADDITIONAL PROPERTY has been acquired by W. H. Morgan and Company, Toronto, Ontario, manufacturers of paper boxes and containers and other paper goods. The company will use the new property as a site for a new plant unit for the production of folding paper boxes and containers. It is reported that $50,000 will be spent for the new unit.

JAPAN TO BUY RAYON PULP IN U. S. & CANADA

There has been a recent revival of demand for rayon pulp at the British Columbia Pulp and Paper Company, it was revealed recently. The demand has come from Japan, which country purchased considerable tonnage in 1937 but, because of difficulties in the provision of credits, had not purchased any great amount during 1938.

Reports from Tokyo, however, indicate that the Japanese minister has granted permission to the Rayon Pulp Import Control Association to import some 50,000 tons of pulp for the manufacture of rayon. This is an increase over the 30,000 tons granted originally. The change was permitted because of prospects of increased exports from Japan of rayon products due to interruption of supplies in various markets through the European war.

Of the total quota, 25,000 tons are to be sought in the United States and Canada and the other 25,000 tons from northern Europe. B.C. has already received orders and its two mills are operating at capacity. Shipments of the 50,000 tons are to be completed at the end of February.

CHARTER NEW ENGLAND PULP AND PAPER CO.

The New England Pulp and Paper Company has been chartered under Massachusetts laws by Robert Traverse of Worcester, who is president, and Franklin E. Smith of Boston, treasurer. The company's purposes are "to carry on the business of manufacturing pulp by using special machinery for de-inking papers, to manufacture paper from pulp, to manufacture plastics." The capital authorized is $200,000 of preferred stock and $60,000 of common stock.

Previous announcements of this new company stated that a new plant for the de-inking of printed waste paper under the McGregor system was to be erected shortly (cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 630, Sept. 1939).

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PAPER STATISTICS

Fifteen million acres of paper is a blanket which would cover more than five times the area of the State of Connecticut, but it is the quantity of newsprint used in the United States this year, according to Royal S. Kellogg, secretary of the Newsprint Service Bureau, New York City.

"Those who are statistically minded," said Mr. Kellogg, speaking before the New Haven Advertising Club, "can picture this tremendous quantity of newsprint paper in other striking ways. It would, for instance, make a belt nearly a mile around the earth at the equator or extend in a strip 500 feet wide from the earth to the moon."

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FINANCIAL

The paper industry during the past month has reached an all-time peak of production, not only in the percentage of capacity to which the mills are operating, but in the total tonnage manufactured. With a general condition of prosperity, there is little evidence of speculative accumulation of stocks, and the war situation appears to be merely a single factor in the upward trend of business. Stock market prices, however, have remained at moderate levels, with actual lower prices in some issues as compared with a month ago.

Crystal Tissue Company — Net profits for nine months were $64,268, compared with a net loss for the same period of 1938 of $11,229.

Dixie-Vortex Company—Net profits for the year ending September 30 were $838,519, compared with $729,118 for the previous year.

Eastern Corporation—A net profit of $25,000 is reported for September, the first profit to be earned since the company came through its bankruptcy proceedings. For nine months, the loss is $33,059.

Robert Gair Company—Net loss for the quarter ending September 30 of $96,079, compared with a net loss of $37,946 for the same period in 1938.

Hinde and Dauch Paper Company —Net profit for nine months ending September 30 was $422,305, as against $480,397 in the same period of 1938.

Hummel-Ross Fibre Corporation — Net sales in the nine months increased $76,000.

International Paper Company — A net profit is reported of $635,133 for the quarter ending September 30, compared with $77,740 for the same period in 1938.

Lily Tulip Cup Corporation—Net profit for the twelve months to September 30 was $467,675, compared with $344,819 for the same period of 1938.

Mead Corporation—A profit of $246,517 is reported for the first forty weeks of 1939, compared with $22,999 for the same period of 1938. The upturn was principally accounted for in the last quarter.

Minnesota and Ontario Paper Company—Net loss for the September quarter was $381,008, compared with loss of $559,238 for the same quarter of 1938. Losses for the first nine months were reduced $400,000, as compared with the previous year.

Nashua Gummed and Coated Paper Company — Net earnings for nine months were $130,056, compared with $39,605 for the same period in 1938.

National Container Corporation — Net profit for nine months ending September 30 was $159,744, compared with $71,798 for the same period of 1938.

Oxford Paper Company—Net profit for the nine months ending September 30 was $383,919, compared with $71,226 for the same period in 1938.

Scott Paper Company—Earnings for the nine months ending September 30 were $1,324,785, as compared with $1,120,032 for the same period of 1938. A stock issue of 30,000 shares of $4 preferred has been announced, and the proceeds, about $3,000,000, will be applied to payments on various outstanding construction contracts, as well as for betterments, and to acquire 2,000 shares of stock of the Brunswick Pulp and Paper Company.

Soundview Pulp Company—Net income for the nine months to September 30 was $293,752, compared with $374,351 for the same period of 1938.

Union Bag and Paper Corporation —Earnings for the twelve months ending September 30 were $579,439, as against $1,109,974 in the same period of 1938. The first nine months of this year show an increase over the same period of 1938.

West Virginia Pulp and Paper Company—The sale of $8,000,000 in bonds for the redemption of an issue of $10,000,000 placed only two years ago will involve a reduction in interest charges from 4½ per cent, the original interest rate, to 3 per cent, the interest rate on the new issue. The company reports earnings for the nine months ending July 31 of 5.6 times the new interest charges.

New York Stock Exchange—Stocks

	Closing Prices Nov. 25	Oct. 25
A. P. W. Paper	.....	3
Celotex	10½	11½
Same Preferred	60¼	62
Certain-teed	7¼	8⅛
Same Preferred	34½	36¾
Champion P.&F. Co.	25¼	28¼
Same Preferred	101½	*100¼–101
Container Corp.	15¾	16⅜
Cont. Diamond	7⅛	8½
Crown Zellerbach	15¼	16¼
Same Preferred	89	88½
Dixie Vortex	13¼	12¼
Same "A"	34	*32¼–32½
Flintkote	21⅛	22⅞
Robert Gair	4	5½
Same Preferred	16½	18⅜
Gaylord Container	13¾	15
Same Preferred	.....	*47¼–50
Internat'l P.&P. Co.	12½	14¼
Same Preferred	47½	51½
Kimberly-Clark	33	36¾
MacAndrews&Forbes	31	*30–30½
Masonite	39	41¾
Mead Corp.	11	13
Same Preferred	71½	72
Paraffine Co.	45⅛	46
Rayonier	16	17¾
Same Preferred	25½	26
Scott Paper	49⅛	50
Same Preferred	114½	114
Sutherland Paper	29	27½
Union Bag & Paper	11¼	12½
United Paperboard	6	.....
U. S. Gypsum	80½	84¾
Same Preferred	.....	165

New York Stock Exchange—Bonds

Celotex 4½%	85¼	85
Certain-teed 5½%	77¼	75⅞
Champ. P.&F. 4¾%	104⅞	.....
Container Corp. 5%	105	95½
Inter. P.&P. Co. 5%	101¾	99¼
Same 6%	93½	92¼
Mead Corp.	104	.....

New York Curb Exchange—Stocks

Am. Boxboard	6½	7½
Brown Co. Pfd.	20	25½
Det. Pap. Prod.	.....	*1⅜–1⅞
Great Northern	43½	41¾
Hummel-Ross	5⅛	5⅜
Nat. Container	8¾	9
St. Regis	2⅞	3¾
Taggart	4½	4¾
United Wall Paper	1⅞	2

*Closing Bid and Asked Prices.

ADVERTISING PAGES REMOVED

▸▸▸ THE ADVANCE BAG AND PAPER COMPANY has been consolidated into the Southern Advance Bag and Paper Company with a legal head office in Bangor, Maine, it was reported recently. The single corporation now has an authorized capital stock of three classes: 8,000 shares of Class A, 7 per cent cumulative preferred, par value $100; 13,000 shares of Class B of the same value, and 12,500 shares of common stock of no par value.

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RAYONIER, INC. SHIFTS KEY MEN TO FERNANDINA

Preparing for the impending opening of its new unit at Fernandina, Florida, Rayonier, Inc., recently transfered some twenty-five or more key men from its three major dissolving pulp plants in western Washington to the Florida branch. Some of the men will remain at Fernandina permanently, it was reported, while others are on temporary assignments to help get the unit organized and operating. The men were shifted from the Port Angeles, Shelton and Grays Harbor divisions of the company.

The Rayonier organization also made a number of permanent transfers in November from these three branches to its smaller pulp plant at Tacoma, Washington, the former Shaffer mill. This unit has been idle for two years and was re-opened recently as a result of the upturn in the pulp and paper business.

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WAR RISK INSURANCE LEGISLATION

Wood pulp and paper exporters and manufacturers will be interested in a mimeographed statement on war risk insurance prepared by the Division of Commercial Laws of the Department of Commerce.

The statement is a summary of war risk insurance legislation of the United Kingdom, Denmark, Estonia, Belgium, France, The Netherlands, Norway and Sweden and a copy of the bill now pending in the Congress of the United States (HR 6572) to amend the Merchant Marine Act of 1936 to provide for marine war-risk insurance and reinsurance and for marine risk reinsurance.

The Forest Products Division has a limited number of copies of this statement available on a short-period loan basis for firms interested in wood pulp and paper exports.

JOHNS-MANVILLE DEDICATES NEW PLANT IN VIRGINIA

▸▸▸ REPRESENTING A NEW Southern industry, the new plant of the Johns-Manville Corporation at Jarratt, Virginia, was formally dedicated on October 19 by Lewis H. Brown, president of J-M, in the presence of Governor James H. Price and other state and federal officials.

Already running at full capacity, with a payroll of over 450 men, the factory is the largest insulating board plant of its kind in the world and is the first to manufacture the product from loblolly pine, a process made possible by means of a new technique developed in the J-M research laboratories.

At a luncheon held following the dedication, Mr. Brown spoke of the growing significance of insulating board as a raw material. Because of its low cost and ease of application, he pointed out, it is one of the most promising of all materials available for moderate and low cost construction. At the new plant in Jarratt, insulating board will be produced for sheathing, for decorative interior walls and ceiling surfaces, for insulation of roofs and for plaster lath.

The all-day dedication was the biggest event ever staged in the village of Jarratt. Shortly after noon, a free barbecue was served to 3,500 townspeople and visitors from neighboring communities. At the same time, 400 building men, officials, and company dealers were lunching in a huge circus tent erected for the occasion. All afternoon "open house" was held at the factory which was running full tilt, so that visitors and guests could get a look inside the building and see how the product is made.

Above—The south side of the new Johns-Manville factory at Jarratt, Va. Below—Inspection and control room at the northeast end of the new plant.

PRICE CHANGES

A sharp increase in the price of kraft liner board has been announced by the Southern Kraft Corporation effective for the first three months of 1940, the new price being $55 per ton as against the contract price of $45 for the final three months of 1939. It is likely that other manufacturers will follow this price increase with similar announcements. The domestic producers held strictly to their contract price of $45 during the final quarter of this year but immediately upon the opening of the European war, the spot prices jumped to $55. Inasmuch as Southern Kraft says it will do its best to fill the normal requirements of its regular customers, but may not be able to meet their requirements in full, it seems likely the spot prices will be at least $5 above the contract price.

Whether a comparable increase in the price of kraft paper will be announced remains to be seen. The price is already $80 as against a price of $60 last summer and some manufacturers have withdrawn from the market in order to protect their regular customers.

▶▶▶ THE GREAT NORTHERN PAPER COMPANY and several other prominent American manufacturers of newsprint have announced a price of $49 per ton for paper for the first quarter of 1940 and a price of $50 for the second quarter. The Canadian mills previously have announced a base price of $50, but with the Canadian dollar down to 89 cents, this is equivalent in Canadian dollars to nearly $55 per ton.

▶▶▶ THE INCREASE IN PRICE of bleached sulphite pulp from $50 to $60 for the first quarter of 1940 as announced at New York, will benefit many mills. It is also announced that the rate on unbleached sulphite pulp would be likewise increased.

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WAR TRADE

Further news relative to import and export activities of foreign countries has been released lately by the United States Department of Commerce. The following items supplement those appearing in previous issues of THE PAPER INDUSTRY AND PAPER WORLD.

Sweden

Many Swedish pulp and paper mills have been forced to decrease their activity due to shipping difficulties in the present war. Several plants have shut down entirely because of a shortage of storage facilities. Obviously, it is stated, if submarine activity continues to threaten Swedish shipping bound for Great Britain, heavy losses to the Swedish forest industries engaging in export can be envisaged. It is hoped that the American market may take up some of the slack.

The immediate effect of the decision of the Bank of Sweden to sever the crown from the pound sterling was the drop of the sterling rate of exchange to 17.90. It is pointed out that the crown separation will be a serious drawback to wood pulp exporters since a very appreciable proportion of exports have been sold in sterling.

Netherlands

The minister of economic affairs in the Netherlands is empowered to take control of businesses in certain goods and in line with this policy the Government has taken control of business in raw materials for the paper industry including chemical pulp, pulpwood, ground wood, old paper, resin, paper waste and rags. Paper manufacturers may not offer for sale, purchase, sell or deliver paper raw materials without a license.

Egypt

It is reported that the Canadian Trade Commissioner in Cairo, who cabled his Government at the instance of the director of Egyptian Customs Administration in regard to Egypt's requirements in the way of newsprint, has received a cabled reply expressing Canada's readiness to meet the need. A recent decree forbids the export of paper and cardboard from Egypt without authorization of the Ministry of Finance.

Italy

A sales tax applicable to imports of rough pine, fir and larch wood destined for the production of mechanical and chemical wood pulp has been established at 0.45 lire per quintal (lire equals $0.0505, U. S. currency—1 quintal equals 220.46 pounds).

Denmark

The list of additional products for which licenses for export and re-export from Denmark are required has been published recently. Among other items, this list now includes filter paper. A complete list of the products restricted by the decree is on file in the Division of Foreign Tariffs.

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▶▶▶ CONSTRUCTION of a substantial addition to the Pabco linoleum plant on San Francisco Bay will start soon, according to W. H. Lowe, president of The Paraffine Companies, Inc. Pile-driving operations for foundations have already begun.

NEW ENGLAND MILLS FORECAST CONDITIONS

Paper manufacturers of New England are hopeful that a substantial portion of inventory buying represented by the paper purchases of the first two months of the European war presage a change in the cycle of buying habits. Up to 1929, paper merchants as a matter of normal policy carried much larger stocks actually and relatively than they have since. Following the depression merchants' stocks, in many instances, have been kept below the actual size of the 1920's and in addition the inventory was allowed to shrink to a size much lower than was warranted.

Some believe that the merchants will revert to their old habits as soon as the danger of advanced prices is past. Manufacturers, however, are of the opinion that with the future so uncertain, prudent merchants are protecting themselves by well-rounded inventory which does not need to be excessive. Furthermore, say these New England papermakers, the merchants are better fixed financially to assume the rightful inventory burdens of distribution than they have been since 1930. Once the middle houses have built up their stock there will not be the need for so many frantic mill shipments that are, and have been, a daily event in the business relations of producers and manufacturers.

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▶▶▶ THE MINAS BASIN PULP AND PAPER COMPANY will install two grinders, four wet machines and two hydraulic presses sometime early in 1940, it was reported recently.

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SPRUCE FALLS PROVIDES FOR ITS SOLDIERS

A plan of remuneration for employees on active military service has been announced by the Spruce Falls Power and Paper Company, Ltd., Kapuskasing, Ontario. Wages and salaries will be paid equal to the difference between the amount paid by the company at the time of the man's departure on service and that paid by the Government, up to 50 per cent of existing wages and salaries. Employees may also retain $1,000 of group insurance protection, and the company is going to assume the entire cost of the premium on $1,000. After honorable discharge an employee will be given an opportunity to return to an occupation as nearly comparable to his former one as circumstances permit.

ADVERTISING PAGES REMOVED

PACIFIC COAST MILLS AWARD SERVICE PINS

▶▶▶ APPROXIMATELY 1,000 pulp and paper mill employees in western Washington, principally associated with Rayonier, Inc., were honored by their employers at a series of banquets in mid-November, when they received five and ten-year service pins.

The pins were presented personally to the men and women by J. D. Zellerbach of San Francisco, president of the Crown Zellerbach organization and executive vice president of Rayonier, Inc. Numerous other officials of the two corporations and special guests attended the four banquets.

Governor Clarence D. Martin of the State of Washington was the guest speaker at the banquet of the Grays Harbor unit of Rayonier in Hoquiam, where 399 employees, 60 per cent of the mill's personnel, received the service pins. At Rayonier's Shelton banquet, 275 workers were honored by the presentation of the pins and were addressed by Justice Walter B. Beals of the State Supreme Court of Washington, while in Port Angeles 285 pin recipients heard an address by Ferd J. Schaaf, director of the state department of public service.

A fourth banquet was held at Port Townsend, where 82 veterans of the National Paper Products division of Crown Zellerbach were given pins. A larger number were given ten year pins at Port Townsend last winter when the plant started its eleventh year of operation. The Rayonier mills only recently completed their first ten years.

In his address at each Rayonier banquet, Mr. Zellerbach said that the Rayonier Corporation's pulp production would total about 1,000 tons daily and that the company would have a payroll of some 2,000 persons with the addition of its new Fernandina (Florida) unit which is to open shortly. Mr. Zellerbach was recently honored by the Port Angeles community when the town's Chamber of Commerce presented him with three 21-year service pins in recognition of service to Port Angeles as an official of Crown Zellerbach, Rayonier and Fibreboard Products Corporations.

Banquet scene in the Port Angeles Elks Temple, November 15, when nearly 300 employees of the Port Angeles Div. of Rayonier, Inc., received five and ten-year service pins. At the speakers' table in the left of the illustration are such important persons as: J. D. Zellerbach, executive vice president, who made the presentations; W. L. Raymond, vice president; A. R. Heron, director of industrial relations; N. B. Gibbs, a Pacific Northwest executive of the company; Arthur W. Berggren, Port Angeles resident manager and Eric Haegler, of Rio de Janeiro, South American representative of the company.

NEW ENGLAND PULP NEWS

The past month has developed a congestion of wood pulp at Portland, Maine, despite the short position of many converting mills. The two facts, however, are related. Some mills, by their 90 to 100 per cent capacity operations, had drawn on their pulp inventory until it was dangerously low. It was this condition that caused some of the high spot prices in the past six weeks such as $42 or $43 on the dock for standard northern kraft pulp or $50 delivered for groundwood. The tight position in mechanical pulp was accentuated by the drought that has afflicted northeastern United States and the eastern provinces of Canada, providing little or no water for the grinders as well as decreasing hydroelectric power and throwing a strain on the steam power plants.

Meantime, the shipping situation caused by the war has again tightened, not by submarine sinkings or by elimination of American and German freighters from the service (though these were factors at the war's start), but by the action of German Navy in the Baltic Sea. A large number of Finnish, Norwegian, and occasionally Swedish and Latvian vessels, with pulp for North Atlantic ports have been driven into German ports where they have been detained up to ten days. The Germans, ostensibly, are assuring themselves that the cargoes are not going to Great Britain or Canada or to American munition manufacturers.

Some eight or nine of these vessels were released more or less simultaneously. Their first port of discharge was Portland. Much of the pulp was

for midwestern mills and Portland now has low differential freights to Michigan, Ohio, etc., via the C. P. R. and Canadian National Railways. In order to feed hungry paper mills, the pulp was discharged hastily until the port became temporarily clogged. The mills couldn't take it fast enough and the railroads couldn't handle it rapidly enough. Some of the pulp was diverted to Baltimore for the midwestern consumers.

Other vessels have been released by the Germans, according to steamship agents at Boston and Portland, so during the balance of the year there should be a steady stream of pulp deliveries. The attack on Finland by Russia has, of course, raised a very serious question of supply. There are a number of New England paper mills using Finnish pulp who must be affected by developments in that country.

New England pulp mills have made advances in bleached sulphite similar to those announced by mills in other sections, $10 per ton making the first quarter contracts $60 per ton ex-dock equivalent. Bleached soda pulp was advanced $7 by the leading eastern producer to $58 per ton delivered, the first time in several years that soda has sold for less than sulphite. It is understood that bleached kraft will be raised $10 on contract to $65 dock basis.

There is no stable market basis on groundwood, producers and consumers making each sale on its merits or in some cases what the traffic will bear. Better than $40 has been paid for small blocks of moist foreign wood ex-dock New England ports, and New England dry wood brought $50, in one case, at a customer's mill in that area.

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CONTAINER'S PROFITS EXPLAINED BY PRES.

Earnings of the Container Corporation of America during October of this year were larger than the combined total for the first nine months of the year, President Walter P. Paepcke told stockholders recently. October net earnings approximated $346,000, compared with the $285,308 shown in the previously published report for the nine months ending with September.

In announcing the October earnings Mr. Paepcke stated that September business had largely been booked at pre-war prices and was penalized by immediate sharp raw material advances.

"From our last war experience," Mr. Paepcke brought out, "it is evident that there is no lasting prosperity to be found in the war-time dislocations of business and price structures. The additional profits of industry are usually more than swept away by the inescapable aftermath of post-war adjustments."

It was revealed that the Container Corporation re-opened a paper mill at Wilmington, Delaware, to handle the rush of business.

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PABCO CHOOSES DALLAS AS SW HEADQUARTERS

Dallas, Texas, has been chosen by the Paraffine Companies, Inc., San Francisco, as headquarters for its Southwest District, it was announced by R. H. Shainwald, executive vice president of the Pacific coast firm.

Increased business volume and the rising commercial importance of Dallas and its contiguous trading area were given as reasons for the company's move. The Paraffine Companies will enlarge its distribution of Pabco linoleum and felt base lines through this expansion. Eugene F. Corbin was appointed district manager of the Dallas office.

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N. I. A. A. ADDS NEW CHAPTER

The National Industrial Advertisers Association, continuing its program of sound and consistent growth, granted a charter to its twentieth chapter on November 9. The organization to which the charter was granted is the Industrial Advertising and Marketing Council of Western New England.

An interesting talk was made by Herbert V. Mercready, vice president of the N.I.A.A. and advertising manager of the Magnus Chemical Company, who discussed the growth of the organization and the advantages conferred by membership, after which the charter was presented by Charles McDonough, president of the N.I.A.A. The charter was accepted by E. V. Creagh, president of the New England organization, who is associated with the American Chain and Cable Company, Inc. Directors of the Industrial Advertising and Marketing Council are: G. W. Fletcher of the Stanley Works, T. V. Busk of Farrel-Birmingham Company, D. M. Davidson of the Fafnir Bearing Company, and G. P. Lonergan of the Bristol Company.

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▶▶▶ MOST IMPORTANT CUSTOMER for Canadian kraft wrapping paper is British South Africa. Japan and China rank second and third, respectively.

VANCOUVER KRAFT IS REORGANIZED

Reorganization plans for the Vancouver Kraft Company, Ltd., are now complete. The company is being dissolved and a new one is being formed under the same name. Securities of the old company are to be forwarded to the Title & Trust Company of Portland, Oregon, in order that securities in the new company may be forwarded from registered offices in British Columbia. News of this move came to light when holders of obligations of the California-Oregon Paper Mills and its successor, Columbia River Paper Mills, received notification from F. W. Leadbetter, president of the latter company. It was stated that equity in the reorganized company is represented by obligations of these two latter concerns.

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CELOTEX CORP. ANNOUNCES NEW BUDGET PLAN

A new merchandising plan to stimulate new residential building, repair and remodeling activity among home owners has been announced by the Celotex Corporation.

The plan, known as the Celotex-F.I.C. Budget Plan, allows customers of Celotex dealers to obtain F. H. A. insured loans for permanent improvements up to $2,500 which are payable in monthly installments over a period up to three years, if desired. To make it easy for customers to take advantage of the new F. H. A. terms and to simplify details in handling the loan, the Celotex Corporation has arranged with the First Industrial Corporation (F.I.C.) for the financing of such loans.

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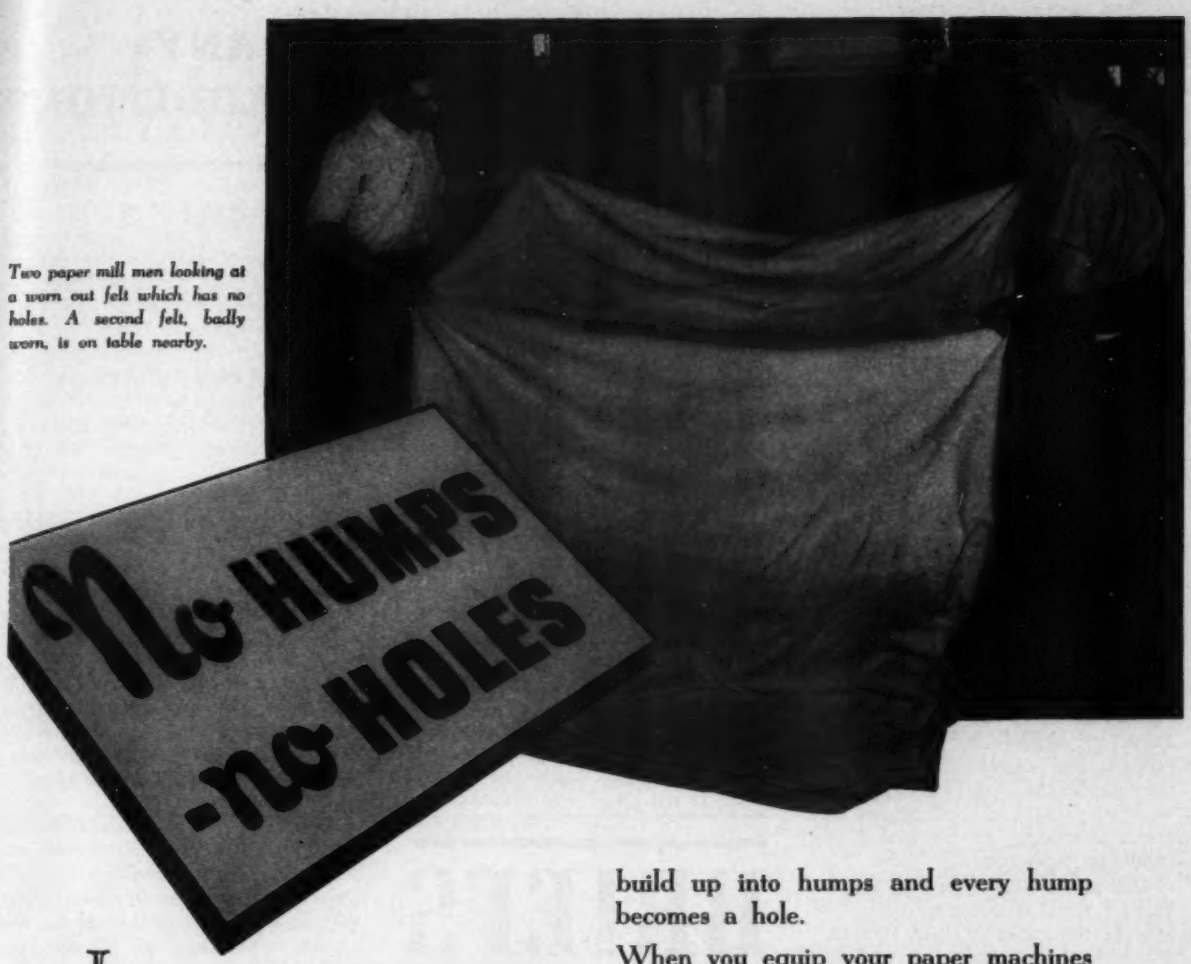
LAKE SULPHITE MILL MAY BE ACQUIRED SOON

Negotiations for the acquisition of the uncompleted sulphite mill of the Lake Sulphite Pulp Company are reported to be near conclusion and it is intimated that complete details will be available by the first of the year.

Several groups have shown an interest in the property, including Victor Donaldson, formerly of the Robert Gair Company, and Lewis Calder of Perkins-Goodwin. It had been rumored that the Gair organization was to act as a negotiator but this has been denied by the company. Recently efforts have been made to have both Canadian and U. S. interests combine in the development of the industry.



Two paper mill men looking at a worn out felt which has no holes. A second felt, badly worn, is on table nearby.

IF YOUR wet end felts wear out unevenly you may be quite certain of one of two things: Either the surface of your rolls is uneven, or the felt itself was not uniform to begin with. With every revolution of the rolls the high areas press more heavily than the low areas; the felt "picks" minute particles from the stock. Gradually these build up into humps and every hump becomes a hole.

When you equip your paper machines with Hamilton Felts you eliminate this cause of felt deterioration so long as your couch and rolls are kept true and clean. Hamilton Felts wear evenly, uniformly and very slowly and they remove water evenly, uniformly and very fast. Your cost system will prove that Hamilton Felts are the most economical.

From the thinnest tissue to the heaviest board, there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

The plan would be to complete facilities for production of rayon pulp and for production of lower grade sulphite.

The new strength in the pulp market, particularly for bleached and unbleached sulphite pulp, has increased prospects for successful conclusion of negotiations for development work. Some $1,500,000 of additional capital would be required to bring the Lake Sulphite property into production.

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SAVANNAH TO HAVE SECOND PAPER FESTIVAL

A week of colorful tributes to paper and Southern pine will take place April 1-6, 1940, in Savannah, Georgia, when that city acts as host to the Second Annual Paper Festival, to be known this year as the Coastal Empire Paper Festival. A new organization, Savannah Paper Festival, Inc., is managing the affair this year. Major G. Hodges Bryant is director.

The 1940 festival in honor of paper will be an event that combines exposition ideas with the carnival spirit. In addition to the actual exposition and educational features of the conclave, Savannah has prepared a series of parades, dances, dinners and mardi-gras ideas all of which pay tribute to paper.

The new name of Coastal Empire Paper Festival is meant to convey the idea of the entire "Coastal Empire" which contains the coast lines of South Carolina, Georgia, and Florida, and a territory extending inland about 150 miles from the Atlantic coast line in these three states.

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CELOTEX STARTS SALES SCHOOL

With the expectation of an increase in 1940 building business, the Celotex Corporation has opened a sales school at the Chicago home office where its entire sales force will go through an intensive training course during the next six weeks. Here the men will receive thorough and complete instructions on all company products and the principles of selling so that they may service the various trade factors they contact in a more practical and efficient manner. These factors include architects, contractors, carpenters, plasterers, roofers, as well as the consumer.

Further, the men will be taught how to impart what they have learned to dealers and jobbers in their respective territories, thereby preparing them to take full advantage of sales opportunities. I. L. Birner directs the sales school.

SCOTT PAPER COMPANY PLANS NEW ADDITIONS

▶▶▶ MUCH OF THE NET PROCEEDS from the Scott Paper Company's recent issue of 30,000 shares of $4.00 cumulative preferred (without par value) will be used for plant improvements and new additions, it was revealed recently. The company has initiated financing plans with the filing of a registration statement with the Securities and Exchange Commission at Washington.

The company intends to use the new proceeds from this financing as follows: $780,000 to apply against remaining payments in connection with the installation or construction of its new filter plant, additional storage facilities, and the newest paper-making machine and finishing equipment and buildings to house them; $400,000 to erect an extension to its present plant buildings including added office space and shipping facilities; $315,000 for improving its paper-making machinery and auxiliary equipment; $100,000 for added finishing machinery; $70,000 for added power plant and maintenance department equipment; $200,000 to purchase 2,000 additional shares of capital stock of the Brunswick Pulp and Paper Company, and $900,000 to provide funds to redeem such of its 3¼ per cent debenture bonds as are not presented for conversion into common shares.

Remaining proceeds including funds not required for bond redemption, will be used to restore $867,000 of working capital expended in the company's current expansion program and for 1940 and 1941 foreign wood pulp requirements.

Announcement has just been made that the Scott Paper Company's ninth and newest paper-making unit and auxiliary finishing equipment are now in production. A new filter plant, also part of the $1,750,000 plant expansion program begun last June, is rapidly nearing completion. This is the third extensive plant expansion program which the Scott Paper Company has completed within the past two years and another is now anticipated.

BRIEFS

▶▶▶ THE STRONG DEMAND IN CANADA for all kinds of papers, including book, writing, kraft of different varieties, etc., has brought an advance in waste paper products from around $5 to $6 to about $9 and $10 per ton. Part of the increased demand has been due to a scarcity of pulp from Sweden and Norway, it is said. It is reported that some of the Canadian mills are using waste paper as a substitute for pulp.

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▶▶▶ QUEBEC MANUFACTURES more pulp than any other province in Canada. Ontario is second, New Brunswick, third, British Columbia is fourth, Nova Scotia fifth and Manitoba, last.

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▶▶▶ IN ORDER TO HAUL LOGS from timberlands in Maine a relatively short distance across the state line to the Brown Company's pulp mills at Berlon, New Hampshire, a permit to function as a contract carrier was necessary and was granted by the ICC. This requirement was imposed under the law irrespective of the fact that the hauling was performed by the company's own trucks or with leased trucks.

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▶▶▶ ABOUT ONE HUNDRED JOBS have been created in the paper industry in Holyoke, Massachusetts, as a result of adjustments to the changes in the Federal Wages and Hours Act which went into effect recently.

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▶▶▶ BRITISH PUBLISHERS will henceforth fill only definite orders for subscriptions for their publications to the Dominions and foreign countries. Newsdealers will not be allowed returns for unsold copies.

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▶▶▶ CANADIAN NEWSPRINT MILLS are prepared to combat any serious demand on their producing capacities, figures for the first eight months would seem to indicate. During the first eight months of 1939, Canada produced 1,805,669 tons or 63 per cent of capacity. This leaves sufficient capacity to take care of a fairly broad expansion in demand.

Editorial

ADVERTISING PAGES REMOVED

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AYE, THERE'S THE RUB!

▸▸▸ THE BULGE OF BUYING, which burst upon the paper industry in September, was spectacular, but limited to that month alone, as the following figures taken from the Kraft Paper Association activities disclose. We have taken these figures because the Kraft Paper Division represents the largest tonnage of any in the industry, excepting the Board Division.

For the week ending September 2nd, the week immediately preceding the declaration of war, the orders received were 94 per cent of capacity.

For the four full weeks of the month, the record reads:

For week ending	*Per cent*
September 9	116.9
" 16	160.8
" 23	135.5
" 30	114.7

Average per week

September	132
October	96.1
November	92.7

The average weekly percentage for the thirteen weeks, beginning with the week ending September 2 up to and including the week ending November 25, was 105.8 per cent of capacity, a very handsome and gratifying expansion of tonnage demand and one that insures capacity operations for an indefinite period ahead. And let no buyer or consumer of kraft paper jump to the hasty and ill-founded conclusion that the mills soon will be begging for orders again.

It was to be expected that there would be a sharp decline in November weekly average orders received after the hectic bulge in September buying. Here's the record: The low point in the thirteen-week record came in the week ending October 28 when orders received were 87.4 per cent of capacity. For the week ending November 4, they were 88.7 per cent. For the week ending November 11, they went to 90.2 per cent. For the week of November 18, they jumped up to 95 per cent and for the final week of November 25, they were 95 per cent of capacity again.

An analysis of the buying for the past thirteen weeks shows that for the month of September both merchants and converters bought freely. For were not prices down to sub-bargain figures and were not stocks of kraft paper down to sub-normal inventories in every position when the bulge burst? The initial rush of buying came mostly from merchants to fill their abnormally depleted warehouses. The converters got their bulge later as they received orders from consumers for whom they must fabricate paper products.

Yes, there has been an upturn in prices, but we happen to know of several large mills who formerly howled for tonnage ceaselessly and who today have such an abundance of tonnage at the old prices that it will be some time yet before they will receive any benefit from the current market quotations. Again, taking the kraft paper figures: The average price for all kraft paper for the first forty-four weeks (to November 4) for the past three years are given below:

Year	Average Price per Ton	Total Tons
1937	$76.16	1,054,660
1938	71.48	936,428
1939	66.25	1,070,275

Thus, for 1939, kraft paper prices are $5.23 per ton less than they were for the corresponding period in 1938, and $9.91 per ton less than they were for the same period in 1937.

Is kraft paper a purchase? Are the kraft paper mills profiteering? Is the kraft paper industry making money? "Aye, there's the rub!"

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SOME FACTS TO COGITATE

▸▸▸ IN 1913, THERE WERE 7 sulphate mills, 18 soda mills, 87 sulphite mills, 183 groundwood mills, and 763 paper mills in the United States. Today there are 27 soda mills, 42 sulphate mills, 76 sulphite mills, 97 mechanical pulp mills, and 736 paper mills in this country.

The pulp productive capacity of the industry in 1914 totaled 3,708,130 tons, this tonnage being made up of 1,789,363 tons of groundwood, 1,341,622 tons of sulphite, 499,325 tons of soda, and 77,820 tons of sulphate; while the capacity of the industry in 1935 approximated 2,237,270 tons of groundwood, 1,935,330 tons of sulphite, 570,710 tons of soda, 1,527,060 tons of sulphate, and 263,500 tons of semi-chemical, cotton linters, rags, etc.—a total of 7,533,870 tons.

Although the number of paper mills in the United States today is less than it was in 1913, the productive capacity of the industry has increased about 2½ times. In fact, statistics show that there were 1,540 paper machines in the United States in 1914 and that these machines had a yearly capacity of 6,439,787 tons. Similar figures for 1936 record a total of 1,533 paper machines with a yearly capacity of 14,458,090 tons. It also has been estimated that the annual capacity of the paper industry at the close of 1939 will approximate 15,800,000 tons.

In 1914, the production of paper and paperboard in the United States totaled 5,152,700 tons. Of this tonnage, newsprint led the list with 1.313,300 tons, while paperboard was second with 1,291,800 tons.

The paper and paperboard production of the United States in 1937 amounted to 12,837,003 tons, the largest production for any year in the history of the industry. In this tonnage, there were 5,802,036 tons of paperboard, 2,053,387 tons of wrapping paper, 1,561,074 tons of book paper, 960,663 tons of newsprint, 608,086 tons of building paper, 540,152 tons of tissue, 138,064 tons of absorbent paper, and 77,985 tons of other paper.

With the increase in productive capacity of the industry came a growing demand for imported pulp. In fact, total wood pulp imports into the United States increased from 675,600 tons in 1914 to 2,394,605 tons in 1937. Of the imports for 1937, Canada accounted for 712,238 tons, or less than 30 per cent; while the Scandinavian countries (Sweden, Finland and Norway) accounted for 1,519,047 tons, or a little more than 63 per cent.

Pulp production of United States Mills in 1937 totaled 6,757,842 tons, or a little less than three times the pulp imports. This domestic production consisted of 1,600,667 tons of mechanical pulp, 2,162,771 tons of sulphite pulp, 2,160,826 tons of sulphate pulp, 507,548 tons of soda pulp; the remainder divided into semi-chemical, screenings, etc.

In 1914, the per capita consumption of paper in the United States approximated 112 pounds; whereas, in 1937, this figure was approximately 240 pounds.

CURRENT THOUGHT

"AMERICAN CHRISTMAS"

WILLIAM SIBLEY

▸▸▸ DO YOU KNOW VERY MUCH about Christmas? "Sure," you say, "that's the time all retailers commercialize sentiment and love; the time when we buy a lot of things we'd like to keep and get a lot of stuff we don't want." . . . Well, of course, that is a very usual (if cynical) atttitude, but even though it is caustic it represents about the depth of true understanding most of us have regarding Christmas. At any rate—I recently learned a great deal about this holiday (and birthday) that I hadn't known. I learned it from a most interesting and illuminating article appearing in the December issue of *McCall's* magazine. The piece was written by a Mr. Roger Burlingame—and frankly, in my opinion, it is so instructive and interesting I feel I would be missing a bet in your behalf if I didn't pass it on to you.

Some Early Sidelights

"Most of us think of the celebration of Christmas as going back without a break to the year one. True, it does go back a long way in many lands. But when the Christmas spirit first came to America it received a severe set-back. Less than a hundred years ago Christmas was not even a legal holiday in parts of the United States. Massachusetts did not legalize it until 1856. In many churches it was not recognized as a feast day as late as the Civil War. It did not enter most of the Sunday Schools until the sixties. In 1853 a young girl complained in her diary that 'the old Puritan feeling prevents it from being a cheerful, hearty holiday.'

"The Puritans who came to America hated and feared Christmas. In England the rich nobles gave Christmas parties which lasted for weeks. A 'Lord of Misrule' ran them. He threw all regular behavior into reverse for the holidays; servants bossed their masters, and children their parents. Much of this gaiety was innocent, but the Puritans thought it dissipated. They renounced the religious part of Christmas because it was in the calendar of the Established Church which they had fled.

"The Plymouth Pilgrims were made to work as hard on Christmas Day as on any other. Boston Puritans fined people for closing their shops on Christmas.

"In 1659 a law was enacted against the observance of Christmas. In 1712 because some of his flock celebrated it the famous preacher, Cotton Mather called them 'corrupt.' Even at the end of the century one minister said: 'We renounced the religious observance of Christmas' and another called it: 'a part of the drapery of the man of sin.'

"Christmas hating was not confined to New England. Quakers, Congregationalists, Baptists, Methodists, and Presbyterians denounced Christmas wherever they happened to be. But all this time the Christmas spirit was making inroads. The Dutch brought St. Nicholas to New York where he became the American Santa Claus. The hanging of stockings came in with the story that once St. Nicholas had dropped a purse down a chimney and it had fallen into a stocking that happened to be hanging at the fire to dry.

"Germans brought the Christmas tree to Pennsylvania. They also brought a person in a fur coat named Pelznickel, who unlike Santa carried whips for the bad children as well as gifts for the good ones.

"In the South Christmas had, from the start, a warmer welcome. Captain John Smith celebrated it with the Indians in Virginia. In slavery days an old English custom turned up. The negroes like the English servants were given extraordinary liberties. For weeks much of their work was suspended and they were allowed to go visiting.

"In Missouri the 'Lord of Misrule' cropped out again in the schoolmaster's riot, when their pupils threw their teacher out of the schoolroom.

"In South Carolina firecrackers became a part of Christmas celebration. At Mount Vernon soon after the Revolution there were magnificent Christmas dinners presided over by the Washingtons.

"Gradually the hearts of the Christmas haters were softened. The gift spirit touched them first, and we find even stern New England churches beginning to recognize the festival by giving to the poor. Then the children began to ask for Christmas.

"In 1822 Clement Moore's famous poem 'T'was the Night Before Christmas' swept the country making Santa Claus real to millions of children. Soon after it swept England. The English admit that America introduced Santa Claus to them.

"The St. Nicholas of Moore's poem made Santa easy to understand. In it he was elf-size (like the little people in the fairy tales) so that he could slip down the chimney without much trouble.

"The full-sized Santa of the Salvation Army and the department stores is more puzzling especially to youngsters in city apartments.

Americans now keep the true spirit of Christmas

"America has made up for her slowness about Christmas. Nowhere in the world today is the celebration happier or more abundant. We do not care what happened in England in the sixteenth century. It does not matter to us that holly, mistletoe, yule logs, feasting were part of Druid or other pagan festivals. Because mistletoe once hung over doorways where greetings were given to long-absent friends it is good for a sly kiss today.

"We have taken the Christmases of the world and united them. In our homes and churches can be found the trees of Germany, the creches of France, the Italian Bambino and presepio. On our walls are the greens of England and Scandinavia. We have given Santa Claus to a large part of the world. We have invented the community tree. Carols burst from our radios.

"Perhaps we may bring this year to troubled Europe a sense of *peace and good will toward men.*"

ADVERTISING PAGES REMOVED

Use of Extraction Turbines

E. R. KAUFFMAN
Westinghouse Electric & Manufacturing Co.

ELECTRIC power for motor drives and steam for processing are pre-requisites in the manufacture of paper, just as truly as raw materials. The power required to drive the barkers, chippers, grinders, beaters, pumps, paper machines and necessary auxiliary apparatus constitutes a sizable electrical load. The steam load required for the digesters, bleachers, dryers, evaporators, and so forth is likewise of equal importance. Hence the production of electric and steam power becomes a major factor in the production of paper and receives its due consideration by executives as well as engineers.

In the construction of plants to meet the rapid growth in this industry, it is interesting and gratifying to note that those responsible have been satisfied only with the best in processes and equipment. Hence, the new plants and many modernized older ones operate with maximum efficiency obtainable under the present status of the art. This modern trend is demonstrated to no greater degree in any part of the plant than in the power house.

In the typical plant, steam is used:—to generate electric power, to supply a process system at 100 to 175 lb. pressure and to supply a second process system usually at 15 to 40 lb. pressure. The thermo-dynamic advantages of using non-condensing and extraction turbines for generating the required electric power and supplying the process steam have long ago been established, and straight condensing power generation with process steam supplied through reducing valves is no longer considered in either new or modernization projects. In units of moderate size, such as are usually found in industrial service, the thermal efficiency of the straight condensing plant may be approximately 28 per cent. However, if all of the electrical energy is developed by non-condensing units, in which the exhaust steam is used for heating or process work, a thermal efficiency of the order of 75 per cent is possible. This ideal condition is of course never maintained in practice, but a large portion of the gain can be obtained by the use of suitable turbines.

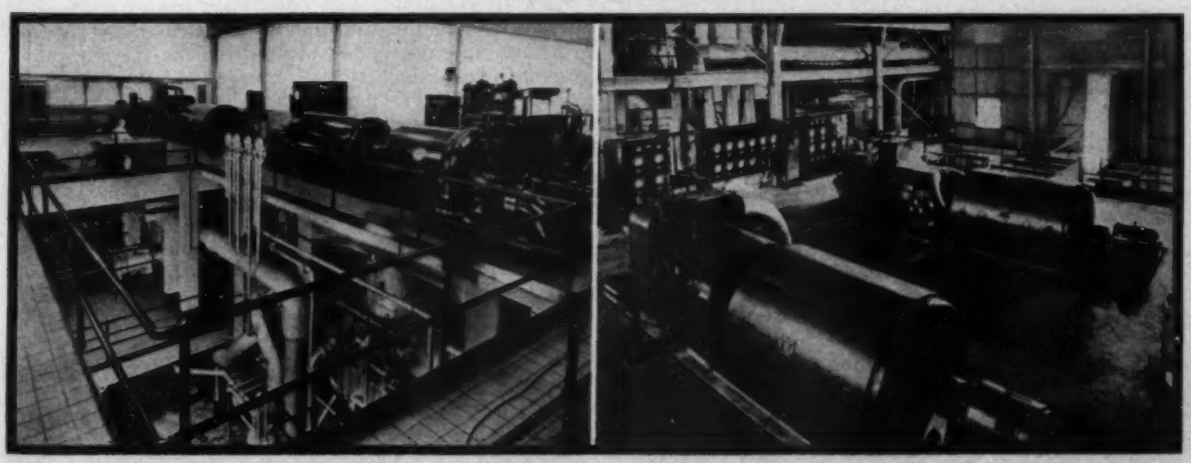
Application

The selection of the proper types of units for each particular installation requires the utmost in application engineering. Practically all of these turbines are tailor made, that is, each one must be designed and built to fit into the particular plant for which it is intended. While the extraction turbine is the type most generally thought of in connection with process steam systems, any discussion of the subject must give due consideration also to the utilization of low pressure steam returning from extraction systems. Hence, the following types of machines, properly called "industrial turbines" fall in the same category and must be considered in any analysis of a plant heat balance.

1) Condensing, single extraction turbines.
2) Condensing, double extraction turbines.
3) Non-condensing turbines.
4) Non-condensing, single extraction turbines.
5) Extraction and induction turbines, either condensing or non-condensing.
6) Mixed pressure turbines.
7) Low pressure turbines.

There are no fixed rules or classifications by means of which these various types can be specified for given applications. The determination of the type or combination of types for any given plant is governed by such factors as:—the electrical load, the process steam load, the variation in these loads (by day, week or season), the relation of the extraction pressures to the initial pressure and the heat drop available between these pressures, the number and types of existing power generating units, connections with outside power lines, capital investment required and plant owner's preference. However, the accompanying tabulation will give a general idea of the principal application for which each type is best suited.

Fig. 1 (left)—4000-kw. condensing double extraction turbine generator (at right) and 4000-kw. condensing single extraction unit (at left). Fig. 2 (right)—6000-kw. non-condensing single extraction turbine generator (in foreground) and 6000-kw. condensing single extraction unit (in background).



Assumed Plant Conditions	Turbines
Variable process load and variable electrical load. Electrical output obtainable from maximum process steam flow is less than electrical output required.	Use condensing, single extraction turbines.
Seasonable, variable process load and variable electrical load which is always greater than output obtainable from maximum process steam flow.	Use non-condensing turbine exhausting into process line, and condensing, single extraction turbine. Can shut down non-condensing unit during periods of low process load.
Two variable process loads and variable electrical load. Process loads relatively small compared to electrical load.	Use condensing, double extraction turbine.
Seasonal process load (fairly constant) and electrical load.	Use non-condensing turbine exhausting into process line, and straight condensing turbine. Can shut down non-condensing turbine during the periods of no process load.
Two variable process loads and variable electrical load. Process load relatively large but electrical output obtainable from maximum process steam flow is less than total required.	Use non-condensing, single extraction turbine with other source of electrical power.
Two variable process loads and variable electrical load. High pressure process load relatively small compared to low pressure process load.	Use non-condensing, single extraction turbine exhausting into low pressure process line; and condensing single extraction turbine.
Two variable process loads and variable electrical load. All high pressure and part of low pressure process loads seasonal.	Use non-condensing, single extraction turbine; and condensing, single extraction turbine. Can shut down non-condensing unit during seasons of low pressure load.
Process load with variable supply from other source, which may be less than or greater than process demand, and electric load.	Use extraction and induction turbine. When other source is less than process demand, turbine extracts. When other source is greater than process demand, turbine inducts.
Process load, electrical load and supply of low pressure steam returning from process line.	Use extraction and induction turbine.
Variable quantity of low pressure steam which may or may not be sufficient to carry electrical load.	Use mixed pressure turbine. Turbine utilizes as much low pressure steam as possible and high pressure steam only when necessary to carry electrical load.
Fairly constant supply of low pressure steam (which cannot be utilized in process or heating) and electrical load.	Use low pressure turbine.

From this variety of types, the proper combination can be selected to meet the requirements of practically any plant. The designs are extremely fiexible in regard to capacities, extraction pressures and initial steam conditions. Hence, each installation is studied individually in order to determine the most satisfactory combination of units and it is seldom that two installations are alike. However, there are certain combinations which stand out as the ones used most frequently.

One of these is the combination of a condensing single extraction turbine with a straight non-condensing turbine. In such a case, the non-condensing turbine exhausts into the high pressure process line (nominally 150 lb.). The pressure in this line is maintained approximately constant by an exhaust regulator. Consequently the electrical load carried by the non-condensing turbine is dependent on the exhaust steam demand and the remainder of the electrical load must be carried by the condensing unit or some other source of power. The extraction point of the condensing turbine supplies the low pressure process line (nominally 30 lb.) and the steam passed to the condenser carries the electrical load which is not carried by the non-condensing turbine and the high pressure end of the condensing machine.

Another combination used frequently includes a non-condensing single extraction turbine and condensing single extraction turbine. In this case, the extraction point of the non-condensing turbine supplies the high pressure process system and the exhaust from the non-condensing turbine supplies the low pressure process system. The electrical load carried by the non-condensing unit is, therefore, dependent on the demand of either or both high pressure and low pressure process systems. The extraction zone in the condensing machine also supplies the low pressure process line in case the exhaust from the non-condensing machine is insufficient. The steam passing to the condenser carries that portion of the electrical load not generated by the non-condensing turbine and the high pressure end of the condensing unit.

This combination is extremely flexible and can be designed for steam flows and pressures so that the two machines will carry both the electrical load and steam load of the plant under practically any normal operating condition. It should be noted that it is not necessary to have a large plant load in order to use these combinations. One example (shown in Figure 2) includes a 6000 kw. non-condensing, extraction machine and a 6000 kw. condensing, extraction machine. The same combination has been used in another installation in which the units are only of 750 kw. capacity each.

Size of Units

Turbines of the types mentioned above can be built for practically any capacity desired. Up to 7500 kw. they are all of the single cylinder arrangement and operate at 3600 r.p.m. In actual practice, there is a decided trend toward higher ratings. Of those units built during the liast few years, more than one fourth are of 5000 kw. rating or higher.

Steam Conditions

This apparatus has been developed for inlet steam conditions up to 1400 lb./in² ga., and a maximum of 950 deg. Fahr. total temperature. The design can be arranged for practically any exhaust pressure or extraction pressure required. In order to realize the better overall performance it is desirable to utilize the maximum inlet steam conditions which are compatible with other plant requirements.

However, the use made of the process steam and its pressure are the major factors which determine the inlet steam conditions. In practically all cases, the ideal condition of steam in the process line is dry and saturated, superheated steam being undesirable. The most suitable inlet conditions are therefore those which will give dry and saturated steam in the process line. Hence, the inlet condtions are governed by the rating of the unit and the pressure drop between the inlet condition and the process lines. It is seldom that inlet conditions higher than 600 lb./in² ga. and 750 deg. Fahr. total temperature can be justified.

Many of the units built during the past few years have been for pressures and temperatures of this order. Likewise the extraction pressures have increased greatly. As recently as ten years ago, 400 lb./in² ga. was considered a high inlet pressure, but during the past few years machines have been placed in service extracting at 400 lb. and many units are operating with extraction pressures of 100 to 200 lb./in² ga.

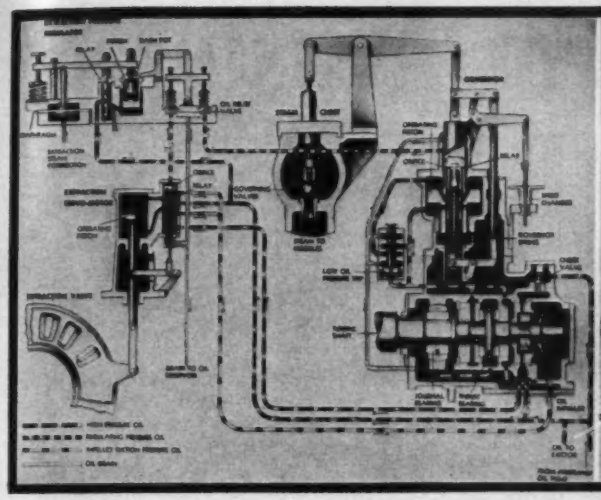


Fig. 3 (left)—Control diagram for single extraction turbine.

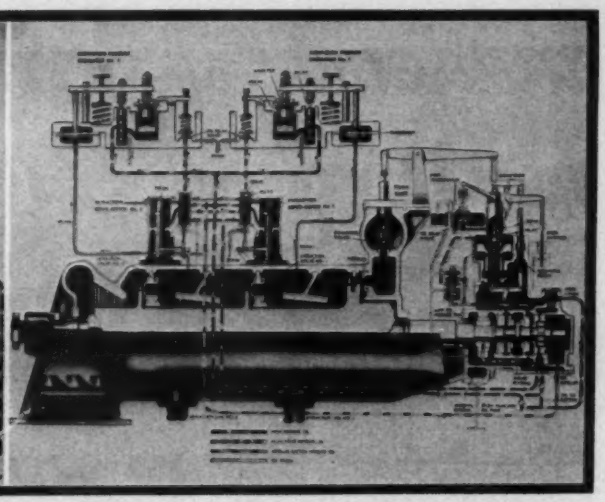


Fig. 4 (right)—Control diagram for double extraction turbine.

The Westinghouse turbines utilize reaction, impulse-Curtis and impulse-Rateau stages in various combinations to obtain the ultimate practical thermal gain for any particular set of operating conditions. Mechanical details have been improved and some of the latest improvements and developments in detail construction, identical to those used on the largest turbines built, are now being applied to the industrial machines, giving improved operating performance and reliability.

Control

An outstanding feature which differentiates an industrial turbine from the average prime mover is its control system. Extraction pressures, exhaust pressures, induction pressures and electrical frequency must be maintained constant, within reasonably close limits, in order to function properly in parallel with other sources of electrical power and process steam. Hence, the control system becomes an important factor in successful operation. The hydraulic control system in which oil is used as the motive fluid is ideally adaptable to the many various arrangements and strict requirements. The principal items of such systems include:—the governor, extraction valve servo-motor, extraction regulator, exhaust regulator, and governor compensator. All of these devices are hydraulically operated and are connected to other parts of the system by pipe lines only, thus eliminating all mechanical linkage. These control systems necessarily become somewhat complicated and descriptions of the many various arrangements which are possible cannot be given here. The following, however, show the more commonly used arrangements.

Figure 3 shows a diagram of a pressure compensated, single extraction control system. With this arrangement, the extraction regulator actuates the extraction valve so as to control the steam flow from the extraction point toward the exhaust, thereby maintaining in the cylinder zone at the extraction point the desired pressure within close limits. The regulator also actuates the main governor so as to increase or decrease the steam flow through the high pressure section of the turbine to compensate for changes in extraction steam demand and thus still carry the electrical load.

Figure 4 shows the simplest control arrangement for a double extraction turbine. The No. 1 extraction pressure regulator controls the No. 1 extraction servo-motor so as to increase or decrease the flow of steam toward the exhaust in respnse to the extraction pressure changes. Likewise, the No. 2 extraction pressure regulator controls its corresponding servo-motor in response to pressure changes in the No. 2 extraction system. A sensitive speed compensator, acting on the governor, maintains the electrical frequency within the desired limits, regardless of changes in electrical load or process steam demand at either or both extraction points. This arrangement is applicable only on isolated systems where the capacity of the speed compensated machine is sufficient to carry the load swings and thus control the frequency.

For other applications (where the speed compensated feature cannot be used) a pressure compensated extraction regulator is used at each extraction point. That is, each regulator is connected (hydraulically) to the governor and to both extraction servo-motors so that a change in either extraction demand re-positions the governor and both extraction servo-motors to compensate fully for the change in steam flow required for the new conditions.

Turbines with these control arrangements are in service, maintaining electrical frequency and two extraction pressures constant (within the required close limits). While admittedly more complicated than the control of a straight condensing machine, the performance has been eminently satisfactory and more than justifies the additional control equipment and attention in operation.

Utilization of Farm Wastes *for* Paper *and* Board *Making*

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▸▸▸ THE USE OF PLANT FIBERS as raw materials for papermaking is said to have begun about 105 A. D., when a Chinese scholar discovered that the bark of trees as well as the filaments of various plants and grasses could be utilized in the preparation of paper *(40)*. The spread of the art of papermaking to the western world began in 751, when the Arabs learned the craft from some Chinese prisoners. The Chinese of this period were using mulberry bark for their paper, but as this material was not available to the Arabs, they used linen rags instead. Therefore, by the time papermaking was introduced to Europe (twelfth century), rags had become thoroughly established as the accepted raw material. The supremacy of rags continued unchallenged until about the middle of the nineteenth century, when they began to be displaced by wood pulp *(30)*. The invention and development of new processes for pulping wood gave such an impetus to the use of this relatively new material that it rapidly became the predominant source of paper-making material, a position which it still holds today.

In recent years there has been an enormous increase in the consumption of cellulosic materials for the manufacture of paper, synthetic lumber, insulating board, and cellulose derivatives, such as rayon, lacquer, etc., thus creating a great demand for cellulosic raw materials. Agricultural by-products of a cellulosic nature, such as cornstalks, straw, etc., offer a possible source of such materials, and investigations have shown that many of them are suitable for some of the uses involved in this demand. In view of the large quantities of these materials available, their present limited usefulness for other purposes, and the fact that the supply is replenished annually as a by-product of valuable crops, it appears that their further use may be of considerable importance from the standpoint of national economy.

Pulping of Agricultural Wastes

All fibrous vegetable tissues are composed chiefly of cellulose, lignin, and hemicelluloses. The cellulose is of most interest to the papermaker, since it is the main fibrous constituent of paper. The cellulose exists in the tissues in the form of long, narrow fibers, more or less surrounded and held together by the other substances, which are usually designated as "incrustants."

The object of pulping is two-fold: first, the removal of the incrustants, and second, the mechanical freeing of the fibers from the bundles in which they occur. The removal of incrustants is accomplished by the use of various chemicals in which the lignin and hemicelluloses are soluble. If a light-colored paper is desired, nearly all of the lignin must be removed, since it imparts a brownish color to the product. The hemicelluloses need be removed only partially unless a very pure pulp, such as the type used in making rayon, is desired. In the manufacture of cardboard and insulating board, the removal of incrustants is less important than in the manufacture of paper; therefore, the pulping process is much milder.

In the process of pulping, the following conditions must be carefully controlled: The temperature and pressure at which the digestion takes place; the duration of cooking; the concentration of chemicals in the pulping liquor; and the ratio of liquor to raw material. The optimum conditions must be determined for each raw material and each type of pulp desired. If the conditions are too mild, part of the lignin will remain and a poor quality of pulp will be produced; if they are too drastic, the chemical consumption will be too high and the yield of pulp too low, the cellulose will undergo chemical degradation, and the fibers will be broken up into shorter lengths, resulting in paper of lower strength.

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(2) Bureau of Agricultural Chemistry and Engineering, Washington, D. C.

There are several chemical pulping methods generally used in this country. They are the so-called soda, acid sulphite, neutral sulphite, and sulphate or kraft processes for producing various types of paper, and the lime process for coarse paper and paperboard. In the soda process, a solution of sodium hydroxide is used for the digestion of the raw material. The acid sulphite process is usually carried out with a solution of calcium bisulphite and sulphurous acid. The neutral sulphite process makes use of sodium sulphite as the active digestion reagent. The sulphate or kraft process involves the digestion of the raw material in a solution of sodium hydroxide and sodium sulphide. In the lime process the raw material (usually straw) is cooked with milk-of-lime. For the manufacture of insulating board the raw fibrous material is usually cooked with water alone under pressure.

Many other processes have been developed, but are not as important commercially as those mentioned above. Some of them may find special application in the pulping of agricultural wastes. For example, chlorine has been used commercially in the pulping of straw *(55, 57, 58, 59)*, and nitric acid in the pulping of bagasse *(16, 47, 50)*.

In general, it may be said that the pulping of agricultural waste materials requires less drastic conditions (time, temperature, and concentration) than the pulping of wood. Although these materials, being less dense than wood, occupy more space in the digesters, thereby reducing the output capacity per individual digestion *(10)*, this disadvantage is partially compensated by the shorter digestion time cycle required for agricultural materials.

Cornstalks

There are at least 100,000,000 tons of cornstalks produced annually in the United States *(22)*. Most of this production is concentrated in the middle-western section of the United States known as the Corn Belt, in some parts of which as much as 60 per cent of the land is planted in corn *(12)*. A mill located in one of these areas would be assured of a sufficient raw material supply with a minimum transportation

cost. The present price of baled cornstalks delivered to the mill is about nine dollars per ton.

The cornstalk is heterogeneous in structure. The relatively long-fibered cortex, or outer layer, is valuable for papermaking, but the pith is comparatively useless for this purpose. Moreover, if the entire stalk is pulped together, the cooking condition necessary for complete pulping of the cortex will cause overpulping of the pith with the result that the paper will contain transparent jelly spots or "shiners" *(8)*. Therefore, a separation of some sort is desirable before pulping. A convenient mechanical separation can be accomplished in which the stalks are divided into three fractions, long fibers, pith, and fines, the long-fiber fraction being especially suitable for papermaking *(91)*.

The use of cornstalks in papermaking is recorded as far back as the seventeenth century *(77)*. The first United States patent on this subject was issued to Burgess Allison and John Harkins in 1802 *(1)*. The Austrian government erected a cornstalk paper mill about 1856 which operated for some time *(77)*. In the nineteenth century, a number of patents on cornstalk paper were issued both here and abroad, but none of them became commercially important. From 1903 to 1907, several United States patents were issued to Drewsen *(28)* on various phases of cornstalk pulping. Dorner *(27)* in 1912 invented a process for treating cornstalks which consisted in hydrolyzing them with dilute acetic acid under pressure, washing, and digesting with sodium hydroxide. In 1911, the Bureau of Plant Industry of the United States Department of Agriculture published a circular *(18)* dealing with the making of paper from a number of crop plants including cornstalks. (This circular was printed on white paper made wholly or in part from cornstalks, broom-cornstalks, rice straw, and cottonseed hulls.) A book by Rommel *(64)* published in 1928 was printed on paper containing cornstalk pulp *(8)*. In 1927, a company in Illinois started making pulp from cornstalks *(39)*. This pulp was successfully used in the making of several different types of paper *(7)*. However, due to the economic depression and the weakened condition of the pulp market, the plant was forced to close in 1931.

Investigators at Iowa State College have recently studied the production of paper *(12, 77)* and insulating board *(13, 14, 15, 78, 80, 81)* from cornstalks. Much of this work was conducted in co-operation with the National Bureau of Standards *(31, 37, 79, 84, 91, 93)*. A small-scale mill was set up in order to study more effectively the manufacture of insulating board. The results of these studies were utilized by a company in Iowa *(36)*, which has been making cornstalk insulating board since 1929.

Corncobs can be reduced by the usual methods to a pulp which is rather short-fibered and too weak to be of much value as a papermaking material *(76)*. However, this pulp can be used as a filler in blotting paper in amounts up to 25 to 30 per cent *(43)*.

Straw

The annual production of cereal straws in the United States is estimated at about 84,000,000 tons *(48)*. Wheat straw, the most important of the cereal straws from the industrial point of view, is estimated at about 50,000,000 tons annually, of which about 575,000 tons were utilized in 1929 in the making of paper and fiber board *(82)*. Oat straw is estimated at about 23,000,000 tons, barley straw 7,000,000 tons, rice straw 1,150,000 tons, rye straw 2,800,000 tons, and flax straw at about 1,500,000 tons *(82)*. The distribution of straw-producing areas is such that in six of the middle western wheat-growing states (Kansas, North Dakota, Oklahoma, Illinois, Indiana, and Ohio) the average production of wheat straw is more than 50 tons per square mile on the basis of the total area of the state, both producing and non-producing *(34)*.

Wheat straw is fairly typical of all the commoner types of straw and is the principal source of raw material of this type for industrial utilization. Oat straw is less desirable than wheat straw for making board, and since it is more valuable on the farm as a feed and bedding material, it is less likely to be used in the paper and board industries *(82)*. Rye and barley straw may partially replace the wheat straw in paper and board making without appreciably altering the quality of the product. Rice straw offers possibilities for papermaking and finds some use in the areas where rice is grown extensively *(18)*. Flax straw deserves special consideration and will be discussed in greater detail.

Like cornstalks, straw has a fairly long history as a papermaking material. Authenticated records *(40)* show its use in 1765 by Jacob Schäffer in Germany. In the United States, the first straw paper was made in 1828 by William Magaw of Meadville, Pennsylvania *(85)*. This venture apparently was successful, the paper being made for many years in a mill at Chambersburg, Pennsylvania. Later, other papermakers entered the straw paper field, and in the late years of the nineteenth century one mill alone was using 3,000 tons of straw annually.

All of the usual pulping processes have been applied to straw. The soda process has probably found more application than the others up to the present time, various modifications having been introduced to make it more suitable for straw *(3, 44, 46, 63, 87)*. The usual acid sulphite process is not well suited to straw pulping, but modified processes employing neutral or alkaline solutions have been used effectively *(6)*. The kraft process has been employed in Russia *(56)*. In 1936, the National Bureau of Standards *(94)* reported an investigation on a modified sulphate (kraft) process for making paper pulp from cereal straws. Investigations on a modified kraft process are now being carried on at the U. S. Agricultural By-Products Laboratory. Processes for the pulping of straw by means of chlorine have been developed by De Vains in France *(55, 84A)* and Pomilio in Italy *(57, 58, 59)*; the Pomilio process is in commercial operation in Italy, South Africa, and some South American countries.

While straw pulp is not a serious competitor to wood pulp in papermaking, the manufacture of various types of straw board is an industry of considerable importance. The 1938 edition of *Lockwood's Directory of the Paper and Allied Trades* (published by the Lockwood Trade Journal Company, Inc., New York, N. Y.) lists over forty mills making straw board or straw paper. Most of the mills are located in the middle western states of Illinois, Indiana, Ohio, and Michigan. The process generally used consists in cooking the straw with milk-of-lime in a rotary digester under pressure *(24, 32)*. This method does not remove lignin very effectively *(87)* and is, therefore, not very useful for making paper pulp, but it is quite satisfactory for straw board, where the dark color is not objectionable. A process developed at the United States Forest Products Laboratory *(65)* makes use of a mixture of sodium carbonate and sodium sulphite for pulping. It is claimed that this method of pulping produces a board having less odor than one made by the lime process.

Straw board usually contains 5 to 15 per cent of waste paper to give it the proper amount of fine aggregate. Its chief uses are in the making of corrugated cardboard, fiber shipping boxes, egg case fillers, tablet backs, etc. *(32)*. The manufacture of insulating board from straw was undertaken in 1927 by a company in Missouri *(34)* which is still in operation.

Flax Straw

Flax straw is especially attractive to investigators in the paper field because of its unusually long fiber. The type of flax grown for making linen is, of course, too valuable as a textile fiber to admit of its use in papermaking except indirectly in the use of linen rags for the most expensive grades of paper. However, in this country most of the flax is grown for its seed; the plants are branched and are shorter and bushier than when grown for fiber *(66)*. The straw is then used principally in the manufacture of tow for upholstery. Seed flax straw has been the subject of many pulping investigations. In 1916, the Bureau of Plant Industry published a bulletin *(53)* on the utilization of flax straw in the paper and fiber-board industry. The results of laboratory and semi-commercial experiments showed that a satisfactory fiber-board can be made by cooking flax straw with lime. Later, the United States Forest Products Laboratory conducted a number of experiments with this material, using sodium sulphite *(20)*, chlorine *(67, 70)*, sodium hydroxide, and a mixture of sodium hydroxide and sodium sulphide *(21, 69)* as pulping agents. The chief obstacle encountered in the pulping of whole flax straw is the difficulty of completely pulping the woody shives, which contain most of the non-cellulosic materials, without overpulping the long bast fibers, which are nearly pure cellulose. This difficulty may be reduced by a complete or partial mechanical separation prior to pulping. The possibility of utilizing flax straw for the commercial production of cigarette and similar papers was pointed out at a Farm Chemurgic meeting *(75A)*. The Forest Products Laboratory has published a report *(68)* embodying the results of its investigations on the pulping and papermaking properties of seed flax straw.

Bagasse

Bagasse consists of the fibrous portion of the sugar cane stalk which remains after the extraction of the juice. Continental United States produces about 500,000 tons a year and Puerto Rico and the Hawaiian and Philippine Islands produce annually about 2,800,000 tons *(16)*. This material accumulates at the mill during the sugar extraction process and must be disposed of in some manner. Originally it was simply stacked in huge piles and burned. Later it was discovered that it could be used as fuel under the boilers in the mill for producing steam. However, since it is decidedly inferior as a fuel *(45)*, it would be advantageous if oil could be substituted for the bagasse and the latter disposed of in some other way. This has led to many attempts to utilize bagasse in making paper and board.

The chief advantage of bagasse over the other agricultural wastes is that it involves no great problem of collection. The costs of collecting, crushing, and washing the material are borne by the sugar extraction process and the bagasse, when delivered to the paper or board mill thus requires no further preliminary treatment before pulping. It has been found that properly baled and stored bagasse will keep in good condition for at least a year *(29)*.

The manufacture of paper from bagasse has been studied with reference to the soda and the sulphate processes *(88)*, and it has been found that book and writing paper of good quality can be made by the soda process *(29)*. A lime-cooked bagasse pulp, when treated with asphalt, produces a good weather-resistant mulch paper. Such a paper has been made commercially in Hawaii *(51)* where it has been used with success in mulching the sugar cane and pineapple crops.

The most important use found for bagasse, thus far, is in the manufacture of structural insulating board. Shortly after the World War, a private corporation made a systematic study in an effort to find the most suitable raw material for a board of this type. They finally decided on bagasse. In 1921, this firm began making insulating board at a plant in Louisiana *(25, 45)*. It is claimed that one ton of bagasse yields approximately 3,000 square feet of insulating board *(25)*.

A bagasse insulation board has also been manufactured in Hawaii *(35)*. In Cuba a new process for milling sugar cane was developed *(73)* with the particular object of leaving the fiber in a better physical state for board production.

In recent years, investigators of the Bureau of Chemistry and Soils (now the Bureau of Agricultural Chemistry and Engineering) in Washington, D. C., and at the U. S. Agricultural By-Products Laboratory at Ames, Iowa, have published a number of articles dealing with the pulping of bagasse by the nitric acid process *(16, 17, 47, 50, 92)*. This process involves treatment of the bagasse with dilute nitric acid, followed by washing and further treatment with dilute alkali. This method requires no pressure digestion, but the acid treatment must be carried out in acid-resistant equipment. An easy-bleaching pulp can be prepared which can be used after further purification in making rayon and other cellulose derivatives *(47, 50)*. The recent development of new analytical methods by the U. S. Agricultural By-Products Laboratory *(92)* has increased the usefulness of the nitric acid process. This laboratory also found that for pulping purposes an alcoholic nitric acid solution has certain advantages over aqueous solutions of nitric acid, resulting in higher yields of pulp with a lesser degree of degradation *(16)*. Further investigations on pulping bagasse by the nitric acid process and by a modified sulphate process are now in progress at this laboratory.

Cotton By-Products

The fibrous by-products of the cotton industry consist of the stalks or stems, pods, hulls, and linters. It is estimated that about 18,000,000 tons of cotton stalks and 1,800,000 tons of cottonseed hulls are produced annually in this country *(22)*. Of the 238,000 tons of linters produced annually from cottonseed, about 45,000 tons are consumed for textiles and about 50,000 tons for chemical cotton *(82)*. The remainder is used for stuffing mattresses and for miscellaneous purposes.

The utilization of cotton stalks in papermaking has been attempted. In 1925, the National Bureau of Standards published the results of an investigation *(74)* on cotton stalks as a papermaking material. It was found that the stalks required long cooking periods, and the paper made from the pulp was weak and of poor appearance. The pulping of the entire cotton plant also has been suggested *(23, 54)* but the results obtained so far are not sufficient to draw definite conclusions. A further considerable amount of work on this material will be required before the importance of the whole cotton plant as a papermaking material can be evaluated *(83)*. By the use of the soda process, cotton linters can be made into a high grade paper *(42)*, having many of the qualities of rag paper *(72)*. Cottonseed hulls can be pulped after the removal of the linters, or hulls and linters may be pulped together *(42)*. The hull fiber does not make as good a paper as the linters, but it is suitable for making rough paper, cardboard *(4)*, and blotting paper *(41)*.

Oat Hulls

In the milling of oats, the outer shell or hull must be removed. The potential yield of hulls is approximately 3,000,000 tons a year *(22)*. Only a small quantity of this by-product is used in the manufacture of furfural *(82)*. In 1921, the Forest Products Laboratory *(86)* published an investigation on oat hulls for paper pulp

and straw board. Semi-commercial and mill runs on this material indicated that it could be used in the manufacture of board by digestion with lime in the same manner in which straw is treated. The results also indicated that when oat hulls were mixed with cotton linters or cotton hull fiber, a sulphate pulp could be obtained which appeared suitable for the manufacture of book, magazine, and writing papers.

Peanut Hulls

About 75,000 tons *(82)* of peanut hulls are produced annually in this country. In 1930, the Bureau of Chemistry and Soils *(49)* published the results of a number of pulping experiments using this agricultural waste. The neutral sulphite process was found to be most suitable, producing a good grade of cellulose.

Hemp

The hemp stalk contains two types of fiber. The long bast fibers, separated by a process similar to that used in the production of linen fibers, are used in making rope, twine, and coarse textiles, while the remaining material, known as "hurds," corresponds to the shives of flax to which it bears great similarity *(71)*. The amount of hemp grown in this country for spinning fibers produces less than 5,000 tons of hemp hurds annually. This amount would not be sufficient to justify the building of a paper mill to use hurds exclusively, but they might be used to supplement the supply of other raw materials.

In 1916, the Bureau of Plant Industry published a bulletin *(26)* dealing with hemp hurds as a papermaking material. Semi-commercial tests showed that a good bleached pulp may be obtained from this material by the soda process. (This bulletin was printed on paper manufactured from hemp hurds.)

Other Materials

All fibrous plant materials are potential raw material sources for papermaking and a large number of them have been investigated or suggested for this purpose *(90)*. Various grasses have received considerable attention, especially in Europe, where esparto grass *(75)*, which grows in Africa, has been used for many years in the manufacture of fine paper. About 1923, sawgrass *(38)* was made into paper pulp by a company in Florida. Among other native grasses which have been investigated are the salt marsh rush which grows along the southern Atlantic Coast *(62)* and fresh water cord grass *(61)* which grows along the Mississippi River. Papermaking studies have also been carried out on reeds *(89)*.

In 1915, the Bureau of Plant Industry published a bulletin on the use of tops of the zacaton plant *(19)*, which grows in the Southwest, as a papermaking material. When cooked by the soda process, it was found that this material could be made into a good printing paper.

Among the other fiber materials suggested for papermaking, the following may be mentioned: Grapevines *(2)*; dead leaves *(5)*; artichoke tops *(9)*; goldenrod stalks *(11)*; milkweed *(33)*; castor oil plant *(60)*; and the saw palmetto *(52)*.

Economic Considerations

The fact that paper can be made from an agricultural waste should not be taken as proof that its manufacture would be profitable. Many other factors have to be taken into consideration before any commercial venture can be undertaken with any prospect of success. The first requirement is a cheap, plentiful, never-failing source of raw material, which should be concentrated in a small area in order to reduce transportation charges. The ease of harvesting will be a large factor in the cost of the material. Since the supply of agricultural wastes is seasonal, provision must be made for storing them, and the possible deterioration and fire hazard must be taken into account. The cost of converting the raw material into pulp must be kept reasonably low. There must be an adequate supply of labor. A skilled technical staff is necessary to control the operations. Lastly, there must be an adequate demand for the product at a price which will insure profitable operation.

One of the chief obstacles to the increased use of agricultural wastes in the paper industry is the firmly established position of wood pulp. Pulp mills built for the use of wood are not suitable for agricultural waste materials without some changes in equipment. The manufacture of paper from agricultural materials requires a different type of experience on the part of technical employees. The problem of chemical recovery varies widely in the two cases. Therefore, mill owners are naturally reluctant to change to a new and untried material. Furthermore, consumers of paper made from wood pulp are not inclined to try something new unless it is cheaper or more suitable. The eventual large use of agricultural fibrous wastes and by-products as a papermaking material will probably take place gradually as the paper consumption increases and the pulpwood supplies decrease.

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LUBRICANT TESTS ANYONE CAN MAKE

W. F. SCHAPHORST, M.E.

▶▶▶ HERE ARE FIVE simple and understandable tests for determining comparative values of lubricating oils for journals that require staying power, film strength, and efficient transmission. Tests Nos. 1 and 2 demonstrate staying quality; Test No. 3, shock resistance; Tests Nos. 4 and 5, lubricity. In performing these tests, no "laboratory equipment" whatever is required.

Test No. 1

Dip your thumb and forefinger into the lubricant. Open and close the finger and thumb and note how the oil adheres. Its adhering property is an indication of whether or not it will run out of the bearing. Adherence is desirable in many bearings.

Test No. 2

Place equal-sized drops of two oils having the same viscosity on a glass plate. Tip the plate to a nearly vertical position. The oil showing the greatest resistance to flowing down the plate is preferable.

Test No. 3

Place on a steel plate equal-sized drops of two or more oils having the same viscosity. Hit each drop with a hammer and note how the oil is flattened out and splatters. The oil that does not splatter is preferable because it is most likely to prevent metal to metal contact under severe shock loads.

Test No. 4

Place a small quantity of the oil in the palm of your hand and rub vigorously. A thin, clear film should adhere to all surfaces touched and should not be rubbed away. There also should be an absence of frictional heat.

Test No. 5

Place the lubricant in an open-mouth jar. Dip a wide piece of metal or cardboard into the oil and then lift it above the jar to a height of from 12 to 18 inches and note the film. The broader the jar and piece of metal, the broader will be the film. A first class lubricant will flow off in the form of an even film and will not splash and spatter.

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DON'T LET THE LIGHT GO OUT

▶▶▶ "HOW FAR that little candle throws his beams," remarks Portia in *The Merchant of Venice*, "so shines a good deed in a naughty world."

While not at this time interested in the virtues of "good deeds" in this "naughty world," Shakespeare's philosophical words were recalled with interest recently when an incident was related which has to do with papermaking.

Recently a member of THE PAPER INDUSTRY AND PAPER WORLD'S editorial staff had occasion to pay a visit to his dentist, an oldish man who had been in the profession quite some time. While the dentist snapped X-ray pictures . . . and between nerve-jangling probes of instruments . . . this staff member talked at length about paper and its manufacture. He mentioned that phase of the industry which has to do with felts, whereupon the dentist remarked that they were pretty expensive and forthwith proceeded to expound in detail about all phases of paper manufacture.

A bit amazed at the dentist's evident knowledge of the subject the young man asked him point blank how he came to know about it. "Why," said the dentist, "I worked quite a while in a paper mill . . . on the winder."

It is not known how many former papermakers are now dentists, but it does seem rather remarkable to discover people who have an amazing amount of knowledge about a subject altogether foreign to that with which they make a livelihood. The dentist had not been connected with papermaking for thirty years, yet he knew and remembered the process, the operation of the machinery, and had a full, general knowledge of the field.

Peculiarly enough, one remark made by the dentist was quite apropos.

"You know," he said, "one of our greatest troubles at the mill was *spots and specks* in the paper."

The importance of that problem . . . important during the dentist's papermaking days and important still . . . was brought out recently in THE PAPER INDUSTRY AND PAPER WORLD'S award-winning article, "Spots and Specks in Paper."

Call it what you will . . . it seems more than a coincidence that this highly important phase of papermaking should be so well remembered by one out of the field so long; by one whose primary interest, even while at the paper mill, centered around another field. It is a far cry from orthodontia to "spots and specks in paper," nevertheless it was more than interesting that the dentist remembered so important a point and that a gap of thirty years had failed to erase his knowledge of it although much highly technical knowledge on a different subject had been absorbed by him during that time. Yes, the little candle still "throws his beams." May it always shine—not only over the field of paper, but over all scientific fields. By its light, progress is made.

▶▶▶ THERE IS NO DOUBT in my mind that further progress in industrial safety—and in all safety, for that matter—depends very largely on a clearer and more universal understanding of the real causes of accidents. The purpose of the accident cause code is to serve as a tool in arriving at such an understanding. Let's dig deeper into the cause of accidents. And let's do so on the basis of uniform standards, so that intercompany comparisons and industry tabulations of real accident causes will be possible. (W. H. Cameron, *National Safety News.*)

Creative Imagination *in Research*

JOHN C. SHERMAN, Consultant

▸▸▸ RESEARCH FOR ITS OWN SAKE—undertaken on a broad basis with many assembled workers—will, from time to time, bring into being some new method or new product which more than offsets the vast sums so spent. There is many a needle in the haystack.

And so, as industry declines and dividends vanish, more and more money is devoted to the game of "hunt the needle."

The development of great laboratories by individual companies, by groups of companies, and by professional organizations serving clients, is one of the most astounding features of the decade that has followed the great depression. Equally startling are the results of this organized drive.

The partial replacement of cotton and of silk by synthetic products; the disturbance of the conventional paper-making methods through the use of materials more resistant to water-vapor; the radical innovations in the field of plastics; the strange trend of the dyes toward the pharmacopœial field; the belated trend of paper making toward the southern pines and away from the familiar northern spruces; and many other developments of incalculable significance, all attest this.

There is, however, this peculiar quality of the human mind that it may not be so much stimulated as it is dulled by long-continued pre-occupation in some restricted field of thought; so that creative imagination often is stunted, while suggestions directly aimed at some important new development often are brought into the field from outside sources, from persons whose mental range is unlimited, but not specialized.

This is the cause of that comment so often made by industrial executives that improvements have been brought to them from outside sources not considered likely to produce creative ideas.

Mill management is habitually loath to welcome innovations, mostly from failure to see that progress demands incessant changes of basic ideas and of established equipment which was originally conceived to serve conventional, long established, products.

This reluctance is further due to the superintendent's need to keep up each day's production of salable goods and, if possible, to increase it.

He knows that the allocation of mill equipment to an experimental run may have great theoretical possibilities of progress, but that it will cause a drop in the profitable production for the day so spent.

Since the maintenance of a daily quota of production is his chief duty, his conservatism is logical.

As facing this situation, the author cites a long-established pulp and paper concern which furnished, far from its mills and its management, an amateur mill to which no idea was welcomed until it marked a radical departure from mill methods then extant.

Whenever this experimental mill exhibited a new product of apparent merit, that product was then sent directly into the market to get the reactions of potential buyers.

If "consumer acceptance" seemed favorable, it was then, and then only, referred to the big mills for consideration on the basis of the market study that had been made. At the same time, the crude results from the experimental plant were reported in full to a highly organized laboratory whose special function it then became to interpret the tentative result into operative mill methods. Report also was sent to a cost accounting personnel whose duty it then became to calculate the probable costs and profits.

Suggestions coming to this experimental mill ordinarily came from some individual entirely unfamiliar with the corporate traditions but possessing that creative imagination which could look through supposed obstacles to the development of a new result.

It may well be that further progress in industry will follow from a closer meeting of technological research with this boldly creative faculty of the human brain.

In short, imagination itself is the starting point of progress, and the test-tube and the retort are at their best when they serve as the best means to build a useful result from such imaginative origin.

As matters stand today, however, the typical research-worker is more or less suffocated by the limitations of his special duty. The men who—confined to such routine work—have of themselves conceived and reduced to practice some important industrial development or innovation are

far too few in proportion to the hosts of men so hampered.

By contrast with this "case-hardening" system which limits the individual to some specialized job, consider the case of a man whom the author knows who has the habit of visiting mills, looking over the mill routine, and immediately saying: "But why don't you do it this way?"

He may lack the specialized knowledge to build his idea into operative mill methods; but (with co-operation once established) he has often fathered important developments, and created for himself an enviable position.

The sequence of steps resulting from teamwork between creative imagination and laboratory technic are these:

(1)—An idea is created.

(2)—Its resolution to standardized results by technological experts as follows:

(a)—Resolution into chemical quantities and costs by laboratory staff.

(b)—Resolution into market values by cost-accountants and market investigators to find the commercial significance of the proposal.

Especially must there be a sound understanding of markets not merely as they exist at the moment but as they may reasonably be expected to shift from year to year.

For the most of the innovative products with which the author has had contact there has, in fact, existed no ready-made market whatever.

So along with the refining efforts of the technological experts, there must be the making of a market by marketing experts.

As a matter of fact, those products which have so profoundly affected the established routines of industry recently have not sprung up in response to an insistent demand from the markets but from a well-reasoned belief by individuals possessing creative imagination that a proposed new product would create for itself its own market by benefit of exploitation, advertising, market studies, along with competent sales-management.

In general, a new product may not originate in a group of co-operative researchers but from the brain of some one man—not necessarily himself a genius—which is then evolved into a marketable commodity by technological experts. It is then referred to accountants and other executives to place the new product in a new market.

▸▸▸ The need of closer affiliation between creative thinking and technological experience seems to be of increasing importance because of the huge expenditures now being made in the laboratories of many corporations.

Perhaps this need is best shown by the reluctance of many northern paper mills to envision the possibilities of southern pulp developments.

True, there were difficulties in the chemical treatment of the southern resinous woods, but these were not insurmountable, and the discovery that good paper-making pulp could be produced from the rapidly-growing and low-cost trees of the South suddenly—and sometimes tragically—shook the northern interests.

This situation called for that creative imagination which would be aroused by the sight of such growing wood, its remarkable rapidity of growth, the knowledge that transportation to well-located mills would be easy, reforestation reduced to its simplest terms, and by the favorable labor and re-shipping factors.

On the basis of such a vision, the services of the technological expert finally produced an epochal result. But for lack of that vision, supplemented by appropriate laboratory and field studies, the potentialities of the South lay dormant for fifty years during the steady denudation of northern forests.

It is important to remember that, in this typical instance, the technological difficulties were far more easily resolved than the classical objectors had supposed.

An amusing parallel to this occurred in the growing of certain southern field-crops for their oil content. Regarding one such plant, whose oil-containing "pods" grew underground among the roots, it had been supposed by all the agricultural experts that this plant must be plucked up bodily by hand, stacked on poles to "cure," and then only used for oil-recovery. This involved slow and costly hand labor, and a serious depreciation of the "tops" otherwise valuable for fodder. But no other way was known.

It was proposed, however, by an outsider, knowing nothing of agricultural science, that the tops be mowed off and salvaged when green, the underground system then dug up by machinery and the oil content immediately recovered.

Faced with the usual objections from traditional experience, this man merely said: "Well, it would not cost much to try it."

The test was made, and the result showed not only a full quota of oil, but an important reclamation of the tops, along with great reduction of costs. The same man suggested a rather sensational change of soil, and with still more radical improvement. This plant had been grown mostly on the sandy bottoms of the cotton plantation as a "rotating" crop to kill off the boll-weevil; its tonnage was therefore erratic, spotted, and inadequate to the oil business. All the experts had taught that only on sandy soil could results be obtained. There was no other basis for this expert judgment than the fact that this plant had always been grown in such soil for the stated and accidental reason.

But this particular rank outsider, himself a poor farmer in the remote South, had had the unsophisticated courage to stake his own farm profits on a change from sandy to rich muck soil, and had already got on his three acres a hundred bushel per-acre crop against the general run of from ten to twenty bushels.

To the manufacturer—especially the small manufacturer—who cannot at present realize to the full, for his own interest, the advantages of the enormously costly research conducted by the many hundred-men staffs of great laboratories, it is now suggested that he need not worry about costs if he will bring into closer association the creative thinker and the skilled technician.

Skilled technic he can always buy; it is almost a drug in the present man market; but he cannot buy creation!

The germs of those ideas which have always changed the face of life and industry are like those wild yeasts which float everywhere in the free air, some of them finding lodgment in a nutrient broth.

To use the language of the biologist, however, even the small manufacturer can provide this nutrient broth within his own organization even, if he desires, in the dark of utter secrecy, and admit the germs of thought—creative thought—to develop into some reasonably expected objective.

It is, finally, the part of wisdom to look for these germs outside, in the freedom of an untrammeled mental atmosphere, and then to let them enter only if unsophisticated common sense approves.

PAPER SKETCHES

ABOUT 1450 A.D., KING ZAIN-UL-AB-AD-DIN OF KASHMIR GRANTED LAND TO SAMARKAND PAPERMAKERS WHOM HE HAD BROUGHT INTO HIS REALM, AS A MEANS OF MAKING THEM HAPPY AND CONTENTED.
AFTER INTRODUCING AND POPULARIZING A SPECIAL SIZE LADIES' NOTE PAPER, TOO SMALL WHEN FOLDED TO BE ADDRESSED, H.K. BREWER, STATIONER OF BRIGHTON, ENGLAND, ABOUT 1828, STARTED TO MAKE ENVELOPES ON A SMALL COMMERCIAL SCALE.
THE HIGHEST PAID CRAFTSMAN IN AMERICAN PAPERMAKING IN 1810, THE VATMAN, RECEIVED $1.00 A DAY. AT THIS WAGE HE HAD TO WORK A DAY AND A HALF TO BUY A POUND OF TEA, 2/3 OF A DAY TO PURCHASE A YARD OF COTTON, 2½ HOURS TO GET A POUND OF SUGAR, 8 HOURS TO BUY A GALLON OF LAMP OIL.
TEA
SUGAR
LAMP OIL
A WOVEN PAPER FABRIC, SIMILAR TO THAT USED FOR BAGS FOR PACKING FRESH FRUITS AND VEGETABLES IS NOW BEING MANUFACTURED IN 250 AND 800-YARD ROLLS FOR APPLICATION ON SLOPES OF TERRACES AND OF CUTS AND FILLS, AS WELL AS ELSEWHERE, TO PREVENT THE WASHING AWAY OF SEED AND SOIL.

OPACITY — WHITENESS — BRIGHTNESS

TAKE A POINTER on Paper

FROM THE WHOLE PAPER INDUSTRY

CONVINCED that TITANOX pigments definitely improve the qualities of paper, manufacturers everywhere now use these modern pigments in the making of their finer products. Were you to inquire why they have taken to these pigments in such a big way, they would give you these facts:

- TITANOX pigments have the greatest opacity, whiteness and brightness of commercially produced pigments. A small amount of TITANOX imparts these qualities to paper to an exceptional degree.
- TITANOX pigments are chemically stable and inert. Their whiteness is permanent, and they do not react with other paper constituents. They minimize after-yellowing.
- Light-weight papers have notable opacity and minimum "show-through" when developed with TITANOX. Improvement in printing qualities results from the excellent surface produced. The small amount of TITANOX required to produce desired opacity, whiteness and brightness leaves the strength of the paper unimpaired.
- Finally TITANOX pigments make possible the production of new and different papers which command attention because of their quality and novelty.

3 EFFICIENT PIGMENTS

TITANOX-A (titanium dioxide)
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(titanium barium pigment)
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(titanium calcium pigment)

Desired results may be obtained by using a minimum of TITANOX-A which is unexcelled in opacity, whiteness and brightness. TITANOX-B-30 permits higher loading with economy. For surface application and coating TITANOX-C may be recommended because of high tinting at low cost.

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ALLIED

N. P. A. ELECTS NEW OFFICERS

New officers for the coming year were elected at a recent meeting of the National Paperboard Association in New York City, November 15 and 16.

Henry W. Ellerson, of the Albemarle-Chesapeake Company, was elected president of the NPA; Alan G. Goldsmith was made vice president, and H. S. Adler was elected secretary-treasurer. In addition it was also announced that Fred F. Becker was elected executive manager and that D. A. Sealey was elected secretary of the Eastern Division. Grafton Whiting was elected statistician.

In reviewing the year Henry D. Schmidt of the Schmidt and Ault Company, pointed out that the Association includes 40 per cent of the entire output of American paper and board mills and is therefore the most important single factor in the industry. Discussions during the meeting covered bacteriological studies of the use of paperboard for food containers, and in addition, centered around labor and legal conditions and the general state of trade.

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FOXBORO ISSUES UNIQUE BOOKLET

A unique source of material for those interested in industrial and civic relations, as well as actual history, is the new booklet recently published by the Foxboro Company, Foxboro, Massachusetts, entitled "Foxboro and Foxboro."

Not only does this new booklet present a very interesting story of the instrument company's growth and development, but in addition, portrays the history of the town of Foxboro, pointing out its rich tradition, its early industries and, subsequently, the founding of the Foxboro Company. The 16-page booklet, replete with photographs, is a splendid though informal presentation of a small New England town and its industry and as such would be worth-while reading for any one associated with industry.

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KREBS TO BUILD NEW ADDITION

Construction work will begin shortly on a major addition to the Krebs Pigment and Color Corporation's large titanium pigment plant at Edge Moor, Delaware. The construction program will provide additional plant capacity for producing titanium dioxide and extended titanium pigments which are sold under the trade names *Ti-Pure, Ti-Cal, Ti-Bar, Ti-Sil,* and *Ti-Tint.*

The existing plant at Edge Moor was completed and put in operation in June, 1935. It is reputably one of the most modern industrial units of its kind in this country, incorporating a number of engineering improvements in pigment manufacture. The new addition is scheduled to be completed by the fall of 1940.

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▶▶▶ PAINT PROGRESS, a magazine devoted to the dissemination of news of real interest about paint, is now being published by the New Jersey Zinc Company of New York City. The company magazine is written in non-technical language and contains articles dealing with the varied usages of paint together with photographs showing its application. The magazine also explains the type of research work being done by the company, shows the uses of the company's product and contains some interesting statistical matter and general news items about paint.

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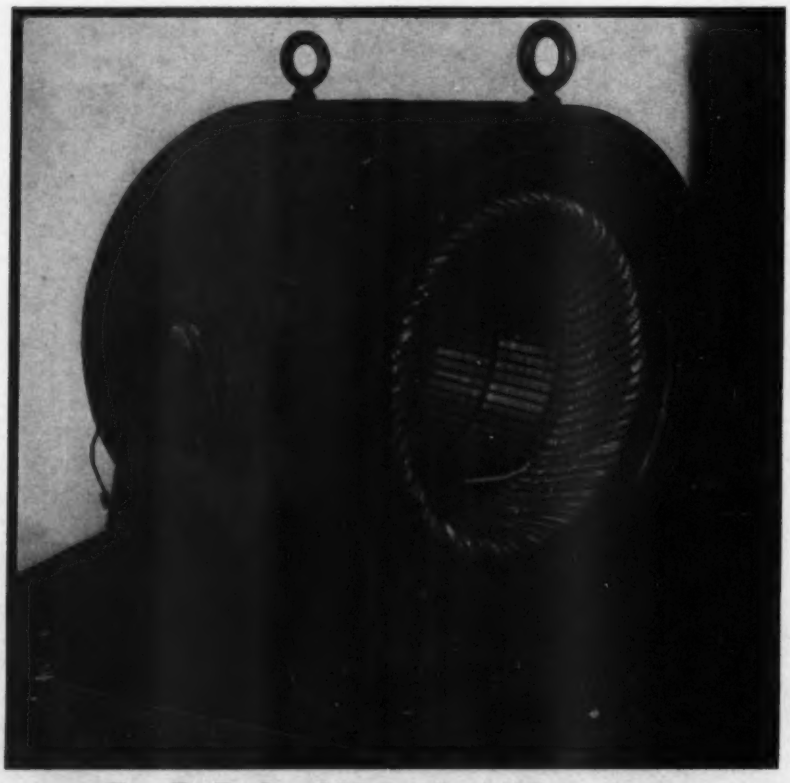
A. D. LITTLE'S VICE PRESIDENT DIRECTS SURVEY

The National Research Council has announced the appointment of Raymond Stevens, vice president of Arthur D. Little, Inc., of Cambridge, Massachusetts, as director of a nation-wide survey of research in industry which is to be started at once. The announcement followed the first meeting of a special committee held at the Engineers' Club, in New York City recently.

In announcing Mr. Stevens' appointment, Dr. Ross G. Harrison, chairman of the Council, stated that while funds



How Do Enclosed Motors Look After a Fire?

The above motor is one of seven 10 hp., 475 r.p.m., fully-enclosed, Type AA, Reliance motors used for driving ventilating fans in the roof of a large mill building which were caught recently in the direct path of a fire started (so far as could be determined) by a broken gas line. Except for new leads and new conduit boxes, all seven motors were in condition to be put back in service without further repairs. Windings and bearings of the fully enclosed units had survived the test unimpaired.

INDIVIDUAL DRIVE AT WET SECTIONS

Prolongs Felt Life – Makes Better Board

THE latest report from a well-known mill* operating three wet-section drives proves these advantages:

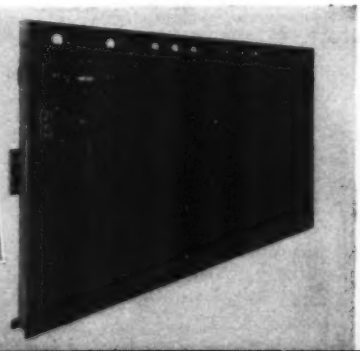
1. **Felts last 75 per cent longer.** Because the bottom felts are no longer used as belts, to haul the load of the wet end, but only to remove water and to carry the sheet, they lasted one and three-fourths times the life of felts of the best quality when no individual drive was used.
2. **Removes more water.** Because the felt can be designed largely for absorbent qualities rather than as a compromise of strength, elasticity, and absorbency, wet-end felts remove more water—where the cost of water removal is lowest—when individual drive is used.
3. **Board Prints Better.** Another advantage is the greater uniformity of board produced using individual drive. The sheet prints more readily and has a better count.

There are other advantages to be had by the use of individual drive. For example, felt stretch can be controlled positively and accurately. For particular information on this or any other type of electric drive for your mill, get in touch with the nearest G-E representative, or write General Electric, Schenectady, N.Y.

MODERN ELECTRIFICATION

Following are 10 of the modern applications of electricity to paper mills devised especially by General Electric to improve productive efficiency.

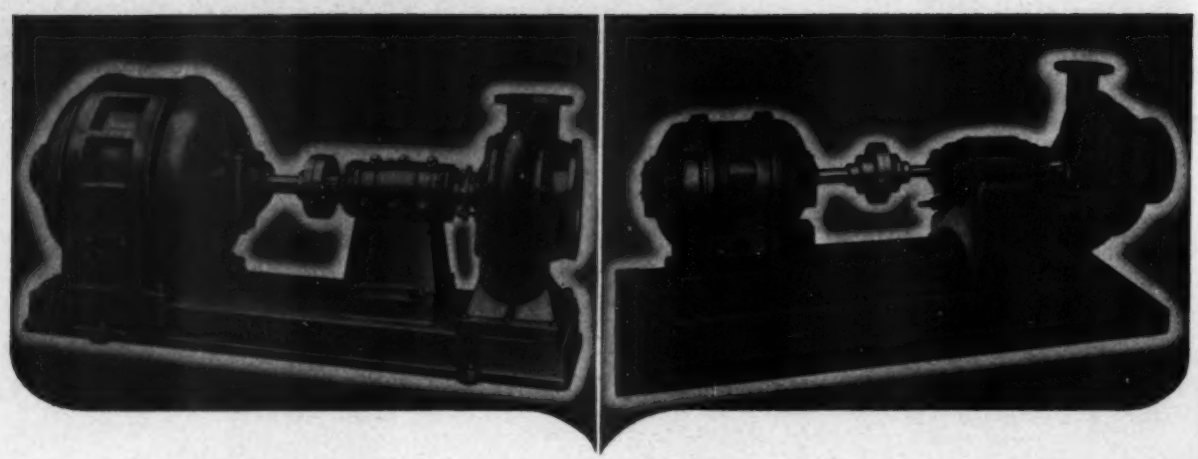
1. Automatic tension control
2. Turbines with 3-arm governing mechanism
3. Progressive draw adjustment
4. Turbines with wide-range electric governors
5. Regenerative tension winder drives
6. Sectional paper-machine drives
7. Selsyn draw adjustment from front of paper machine
8. High-speed voltage regulators
9. Photoelectric register control
10. Direct-connected chipper motors



Above: Individual drive with totally enclosed, force-ventilated d-c motors.
Below: D-c motor and generator panel for individual drive.

*Name of mill on request.

GENERAL ELECTRIC



Each of these Pumps is built for a Specific Job

Every Warren pump for paper mill service—for fresh water, white water, liquors, stock — is designed and built to meet individual operating requirements. Shafts, bearings, stuffing boxes, impellers, clearances — all details are calculated to assure long, consistent service, high efficiency, and low maintenance costs.

This is one of the many good reasons why it's sound engineering to bring your pumping problems to Warren. On your next pump addition or replacement, ask Warren for a quote. Write for complete catalog.

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC., WARREN, MASSACHUSETTS

for the work had been made available by the National Resources Planning Board, of which Fredric A. Delano is chairman, the survey would be conducted and the report prepared by the National Research Council, in accordance with plans approved by an advisory committee of leading scientists, industrial research directors and executives. It was stated that the report will be submitted in printed form by the Council next year and would present an objective study of industrial research as a national resource, as a means of aiding in its further development and utilization.

Mr. Stevens has obtained a leave of absence that will permit him to devote a principal portion of his time to the survey, headquarters of which will be in the National Research Council Building in Washington, D. C.

◆

MAJOR ADDITION AT STEIN, HALL

Stein, Hall and Company, manufacturers of gums and dextrines, is constructing a five-story and basement addition to its factory in Long Island City, New York. The new addition will provide about 27,000 square feet of new production space to meet the increased demand for the company's products which are used by the paper box, envelope, textile, and other industries.

Construction of the addition is of brick-enclosed steel and the floors will be concrete so that the structure will be fireproof. The fifth floor will present a penthouse appearance because the walls will be set back from a parapet running around the edge of the fourth floor roof. This floor will be used for laboratory activities, including pilot plant operations, research and routine work. A new boiler house is being constructed to supply additional steam for heating and production purposes.

◆

MANY ENTRANTS IN IPI CONTEST

Approximately 7,400 printing students from 302 schools have written essays for the Fourth Annual IPI Essay Contest, sponsored in co-operation with the National Graphic Arts Education Guild. The best papers submitted from each of the schools entered in the contest are now being evaluated by the jury of which Harry L. Gage is chairman. The contest advisory committee includes many names prominent in the graphic arts field including Dr. M. F. Agha, art director of the Conde Nast Publications, Inc., A. S. Allen, president of the Allcolor Company and many others. R. G. Macdonald, secretary of the Technical Association of the Pulp and Paper Industry is also a member of the committee.

◆

LONDON ANNUAL IS ISSUED IN SPITE OF WAR

One of the most valuable reference books for all who buy paper has just been received in this country. This de luxe publication is the 1939 edition of Paper Making and Paper Selling, an annual publication produced in the interests of the papermaking, printing, stationery and allied trades, being the fifteenth of the series. This publication is put out by the Trade Journals Limited, London, and to have put out any kind of a publication of 250 pages in times such as these would be a task that should receive the highest merit. But to have achieved a finished job such as this splendid compilation of editorial material and fine paper samples places this company in an enviable position. In the face of turmoil and war, they have not stinted either effort or expense, and should be handsomely rewarded for doing the job so well.

ACCURATE REGULATION OF STEAM TO ATOMIZING BURNERS *means* MONEY SAVING"

Case No. 319

STRAIGHT LINE FLOW ELIMINATES TURBULENCE . . .

Gets HIGHEST VALVE CAPACITY

From inlet to outlet the fluid flows through this valve in a straight line — a streamline — almost as though there were a pipe running through the valve housing for the fluid to flow through. There is no detour around a dividing wall—the direction of flow is not changed at right angles because of a seat wall — also, the flow is not broken up by valve stems, springs, or other parts. The net result is NO TURBULENCE, hence MORE CAPACITY.

CASH STANDARD
Streamlined
TYPE 1000 PRESSURE
REDUCING VALVE
. . . GIVES YOU UNUSUAL EFFICIENCY PROVIDED BY THE STRAIGHT LINE FLOW OF AIR-STEAM-WATER-OIL AND OTHER LIQUIDS AND GASES THROUGH THE VALVE

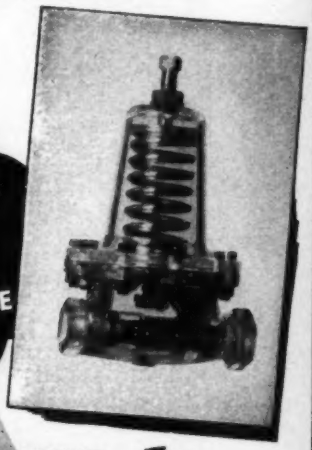
SHOWING HOW THIS VALVE INCREASES PERFORMANCE RESULTS BY ELIMINATING TURBULENCE . . . .

. . . . AND HOW YOU ELIMINATE THIS TURBULENCE

Because of the streamlined flow, you are easily able to meet peak demand and yet hold the pressure constant at the same time. You get abundant flow when you need it most. No turbulence is set up and therefore operation is smoother—you have no pressure variation—you have constant, dependable action—you experience no spoilage results due to turbulence.

* "Regarding your Streamlined Valves, we use them for atomizing steam to our burners. Correct atomization means money saving. We need the lowest possible friction loss (pressure drop) through the valve that is possible. We need highest capacity possible on low pressure difference across the valve. We need constant delivery pressure from the valve regardless of changes in demand on the valve. Your Streamlined Valves give us these qualities better than any other make we have used. And it may interest you to know that we have found that we can count on your Capacity Charts too."

A *Winner* WINS FIRST PRIZE



Statements from Streamlined (Type 1000) Valve users have come to us from all parts of the country—these verify the fact that this modern Streamlined Valve has no complicated parts to get out of order—no small ports or passages to clog up—nothing to keep it from working dependably—that you are easily able to meet peak demand and yet hold the pressure constant at the same time—that you really get high capacity flow when you need it most.

For example Case No. 305 says: "We are getting a better and more uniform product because our processing equipment is functioning better than ever before due to the even control the '1000' Valve is giving us. We also like the large capacity it is giving us."

Case No. 318 says: "Yes Sir! It's easy to say nice things about your Streamlined Valves. We like them very much. They have a whale of a lot of capacity. They control the reduced pressure within exceptionally close limits. They require NO maintenance—and I do mean 'NO!'."

The high pressure entirely confined to the small inlet chamber (cross hatched section) makes this valve good for initial pressures up to 3,000 lbs. The valve is furnished in sizes from ⅛" x ¼" up to 2" x 2½" inclusive. For delivery pressures below atmosphere, a special diaphragm spring arrangement is used

PHOTOGRAPH SENT *Free*

Recently we had a Streamlined Valve made of crystal clear plastic (pictured above) as a display piece for our plant.

The fabricator made a duplicate for himself and entered it in MODERN PLASTIC Magazine's Annual Contest.

First prize in the Industrial Parts, Moulded Group was awarded the plastic Streamlined Valve by MODERN PLASTIC Magazine.

We had a few photographic prints made of the Crystal Clear Streamlined Valve on display in our plant. Each of our representatives was given one. These men have found that the picture proved interesting to people they called upon because the entire simple and efficient construction of the Streamlined 1000 Valve is seen.

You may find it interesting to have one of these photos so that you can see the construction that enables straight line flow—so you can see construction that eliminates complicated parts—and that insures, as users say, "lots of capacity and exceptionally close pressure control."

A photograph will be sent you upon request.

SEND FOR BULLETIN 1000

30-DAY TRIAL *Free* OFFER

Write for details on this special offer made to give you an opportunity to find new ways to save money

A. W. CASH COMPANY
DECATUR, ILLINOIS

CASH STANDARD
CONTROLS . . VALVES

SAFETY

Kimberly-Clark officials and speakers who participated in the annual Safety Day Celebration held in the Kimberly Club House at Kimberly, Wis., November 7. Left to right—W. H. Webb, Wm. Hornbeck, C. A. Fourness, Chas. Eubank, H. Boone, Cola Parker, Harold Fird, E. Mahler, F. J. Sensenbrenner, C. A. Dykstra (principal speaker), S. F. Shattuck, Jos. Doefler, Rev. C. Van de Borne, Chas. Sage, Fred Hunt, F. E. Sensenbrenner, L. Laug, and W. H. Clifford.

KIMBERLY-CLARK HOLDS ANNUAL SAFETY DAY

▸▸▸ CLIMAXING THE FOURTH annual Safety Day of the Kimberly (Wisconsin) mill of the Kimberly-Clark Corporation, over 1,200 people jammed the Kimberly club house on November 1 to hear the University of Wisconsin's president, Dr. Clarence A. Dykstra, address them on the subject of safety.

Dr. Dykstra told his audience that "safety is but one aspect of man's long war against hazards." Speaking on security as a broad field of safety, Dr. Dykstra stated that in planning for security we must plan and think or otherwise it will be violence and an end of civilzation.

"Civilization is the art of living together," the educator said, "and it has been lost over and over again. Only peace and co-operation makes for progress. In order to keep the democracy which we prize so highly, we must have an understanding of modern life organization, and the human being, and the way he acts. We must have faith in ourselves that we can find our way through difficulties and faith in our way of life, neighbors, and our inheritance."

Other speakers on the program were: Vice-president S. F. Shattuck, J. T. Doerfler, mill manager; F. J. Sensenbrenner, president of K-C; Ernst Mahler, vice president, and Harold Fird, president of the Workers Union.

Sixty guides directed over 1,500 persons through the Kimberly mill during Safety Day. Divided into groups of twenty, the tours started as early as 9 o'clock in the morning and by noon, 700 people had been taken through. The visitors were shown through the entire plant, with the exception of the digester room, which was not included because of the congestion which would have resulted during the times that the digester were blown.

The entire cast of the Minstrel Show which was the featured entertainment of the Safety Day Celebration of the Kimberly (Wis.) mill of the Kimberly-Clark Corp.

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▸▸▸ THE LOWLY WHEELBARROW, first put on rubber with the development of a special pneumatic tire some five years ago, now may be equipped with a solid tire with great load-carrying capacity for operations where tires are exposed to excessive abuse, according to the B. F. Goodrich Company. A 16 x 3 Goodrich "Vulc-On" tire, cured directly to the wheelbarrow wheel, has been perfected.

"Who sent you in, kid?"

...ASKS THE HALFBACK ON PAGE 33 OF THE KID FROM PAGE 34

"TIME OUT, PLEASE," says the Kid.

"What is this . . . a nursery squad?" growls the Half, "Get off the field."

"I'd like to go home to the next page," the Kid settles down comfortably, "but I can't. I'm *show through.*"

"Ow-w-w-w, an All-Star game," the Half groans, "and we get a paper substitute!"

"Steady, old man, why don't you write the paper mill?"

"I didn't get that signal," the Half tries scratching an ear through his helmet. "What's your play?"

"This paper is holding up your game. Right?" the Kid demands, "So you get the paper manufacturer and Krebs people together. Those Krebs pigments will send me home. They make even the thinnest papers opaque."

"You're a broken field runner with ideas, kid. And this is according to Hoyle?"

"Cleanest play you ever made. You ought to see how white and bright those Krebs Pigments make the paper . . . sharp and clear printing on both sides."

"We have to do something quick," says the Half.

"They're easy to use," says the Kid, "and the Krebs people cooperate with technical information."

". . . with only a minute left to play!"

"Less than a minute," the Kid comes back, "will write that letter."

KREBS PIGMENT & COLOR CORP.

1007 Orange Street, Wilmington, Delaware

OTHER COUNTRIES

ITALIAN NEWS

New Cellulose Plants

Four new factories now under construction at Cuneo, Ferrara, Chieti, and Capua, capable of producing 88,000 tons of cellulose annually from chemically-treated wood pulp, represent Italy's newest bid to attain a goal of self-sufficiency in this important product.

The Cuneo plant, in the heart of the Piedmont chestnut forests, will be the first plant to get under way. Operations are scheduled to begin January, 1940. With an estimated output of 22,000 tons annually, this plant will produce bleached cellulose and cellulose of soda for newsprint, with pine and chestnut wood pulp as the basic materials.

Italy's normal cellulose needs are about 230.000 tons a year, more than half of which is being produced at the present time. With all the factories now being built in operation before the end of 1941, the goal for cellulose self-sufficiency (set for 1942) will be attained one year ahead of time.

Technical Institute

The Italian Ministry of National Education has recently inaugurated a move for the training of technicians by establishing in Fabriana (Tuscany), an Industrial Technical Institute. The school has the express purpose of training men as paper technicians. Fabriano has been noted for centuries for its production of hand-made paper. The firm of Pietro Miliano has placed at the disposal of the new institute, the sum of 100,000 lire and has also agreed to arrange for students to visit its two mills.

Cellulose Experiments

Recent experiments at the Milan Experimental Station by which pulps were prepared from alpha cellulose, esparto and *ampelodesmus,* have revealed that the alpha cellulose is the most convenient for the extraction of cellulose as the resulting pulp can be used for fine paper and pasteboard. It is also used for rayon and explosives, although a rather expensive purification treatment is necessary. Paper produced with alpha cellulose has a rather soft, cottony feel while paper made from esparto is a little less soft.

Another experiment reveals that cellulose can be obtained from the stems of kidney beans. Stems of the plant are macerated in water until the cortical layer is detached from the woody layer. The fibrous mass eventually obtained is pressed, dried, beaten and carded to separate completely the remaining wood.

By Products

Besides attempting to secure or obtain cellulose from every conceivable source, Italy is also pushing the utilization of by products to avoid the losses of lignin, dextrines, sugars, etc. that usually result from the ordinary process. Several processes are now in use in Italy which are said to recover tannic compounds, gummy matter, acetic acid in addition to lyes. Alcohol is obtained by a fermentation process.

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▶▶▶ A SPANISH COMPANY, La Papelera Espanola, has under consideration the erection of a Cellophane plant in the Vizcaya Province.

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FURTHER EXPANSION IN SOUTH AFRICA

A further expansion of the paper industry in the Union of South Africa can be anticipated within the next few years, it was reported recently. A journal of the Department of Commerce and Industries of the Union pointed out that South Africa has adequate supplies of raw materials for the production of most types of paper used in commerce.

Heretofore production of paper in the Union of South Africa has been based upon imported pulp. In 1934 experiments were carried out with Pinus patula pulp and it is reported that this species of pine was found suitable raw material for certain types of paper and is now being used to a large extent. South African Pulp and Paper Industries, Ltd., manufactures pulp from South African wheat straw in addition to the Pinus patula. This company manufactures paper and paperboard.

A leading paper-making concern, the National Pulp and Paper Company, Ltd., now has a mill in course of erection on the Umgeni River at Durban. The company intends to manufacture various paperboards, including chip, liner, fiber, straw and container board.

AUSTRALIAN MILLS PROGRESS

News from Australia indicates that that country has progressed considerably in the establishment of pulp and paper mills. After years of careful investigation it appears that the manufacture of pulp for newsprint, writing, wrapping and fine papers and the manufacture of the paper itself from the local pulp, is becoming a reality.

According to a report issued in a Department of Commerce bulletin, the Australian Paper Manufacturers, Ltd., plant at Maryville, Gippsland, Victoria, was scheduled to open during the middle of this year. The Associated Paper and Pulp Mills, Ltd., Burnie, Tasmania, is about to install its second paper machine following the successful marketing of the initial production while the Australian Newsprint Mills, Proprietary, Ltd., Hobart, Tasmania, reports good progress in the construction of its newsprint plant in southern Tasmania.

A recent report revealed that plans are now being discussed for the establishment of a transparent wrapping paper industry in Australia. Australian Paper Manufacturers, Ltd., are negotiating with a British firm with the view of establishing a plant near Melbourne, according to the report.

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▶▶▶ GOVERNMENTAL OFFICIALS in Greece have been ordered to reduce their correspondence and memoranda to a minimum owing to "a serious shortage of paper in the world market." The order was issued by the Premier-General John Metaxas.

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▶▶▶ GERMANY CLAIMS to have discovered a process for making paper on a large scale from potato haulm, it was reported in *World's Press News.*

◆

▶▶▶ THE DISCOVERY OF A NEW PROCESS for deriving cellulose from cotton seed hulls was announced recently as having been the work of a chemist in the laboratories of Industrias Reunidas F. Matarazzo, Brazil. It was reported that the Brazilian firm had produced sufficient cellulose at its factories to enable it to

PERKINS
HOLYOKE
TRADE MARK REG.

For the Paper Industry

Cotton Rolls
Cotton and Wool Rolls
Interleaved Rolls
Paper Rolls
Embossing Rolls
Chilled Iron Rolls
Granite Press Rolls
Glassine Supercalenders
Web Supercalenders
Friction Calenders

Sheet Calenders
Embossing Calenders
Plating Calenders
Laboratory Calenders
Burnishing Calenders
Ventilating Fans
Rag Cutters
Stock Cutters
Paper Dampeners
Tensile Testers

Mullen Testers

When your felts get into the "loaded" matted condition shown in the left hand picture, what do you do to clean them? Soap powders, soda ash, and similar materials can wash them, but they're hard to rinse out—and fail to give you a properly reconditioned felt.

SEND FOR YOUR COPY

Write today on your business letterhead for your FREE copy of our 28-page PAPER MILL CLEANING HANDBOOK.

With MAGNUS FELTEX

you get the soft, porous full-napped felt shown at the right. Feltex not only insures cleaner, softer felts, but because of its effective non-damaging action, adds so much to the working life of your felts that this one feature alone pays back the cost of the material many times over.

If you've never tried Feltex—you owe it to yourself to give it a real trial now.

MAGNUS CHEMICAL COMPANY
Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants
192 South Avenue Garwood, N. J.

MAGNUS CLEANERS

curtail imports of wood pulp from Norway and Sweden. It also stated that the company intends to patent the process in all countries.

◆

JAPANESE USE PULP SUBSTITUTES

Indicative of a trend that may, in the future, be of importance to American wood pulp exporters is the present situation in Japan regarding the latter commodity. Because of governmental restrictions on imported wood pulp, Japan has been forced to rely on her domestic supply in addition to substitutes for wood pulp. A survey of this situation appeared recently in an issue of *Side Runs on the Paper Trade*, a publication of the United States Department of Commerce.

The disappointing situation in regard to the Manchurian wood pulp supply is attributed to scarcity of raw materials, scarcity of labor and scarcity of fuel. Four plants in Manchuria, reported to have a total capacity of 60,000 tons of pulp annually, had only a production of 17,091 tons. The first five months of 1939, which should show about one-half capacity of 60,000 tons, shows an output, roughly, of 13,000 tons.

The Japanese, therefore, have turned to several substitutes as raw material for pulp, including, in the order of their importance, rice straw, bagasse, reeds, mulberry stalks, mulberry bark, maoran waste, wheat straw, rice chaff, cedar, various deciduous trees such as willow and beech, bamboo grass, seaweed, and bean stalks.

Rice straw, evidently the most important substitute, is used as raw material by five companies, only two of which have an annual capacity of 5,000 tons or more. There are several drawbacks to this material, one being that the fiber content is low. In making newsprint, it is found that only 30 per cent rice straw may be used.

The second most important material, bagasse, is not a new raw material for the manufacture of pulp, but in recent years has been too expensive to produce because of the competitive price of imported pulp. Five companies at present are producing pulp or have planned to do so, although some other fuel will have to be substituted in sugar companies who have been using bagasse for this purpose.

As to the other raw materials, no striking results are apparent in the manufacture of pulp from reeds, and mulberry stalks and bark, while available in great quantities, rot easily, it is said. Experimental work is going forward in the utilization of maoran, wheat straw and rice chaff. There is one company producing pulp from bamboo grass, but although it is said that 65 to 70 tons of pulp can be obtained from 100 tons of bamboo grass, the mill produces only six tons per day. Technical difficulties still stand in the way of seaweed as a raw material, although two companies have gone ahead with plans to manufacture pulp from this material. About 500,000 tons of bean stalks are available for pulp making which would result, it is said, in about 166,000 tons of pulp annually.

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▶▶▶ THE EGYPTIAN MINISTRY OF FINANCE has informed paper manufacturers that it is prepared to give them such financial and moral support as will enable them to increase their production and establish a paper industry in Egypt on a firm basis.

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SPAIN HARD HIT BY LACK OF WOOD PULP

The restriction of the utilization of all types and kinds of paper products in Spain seems to be inevitable, according to reliable sources, unless another source of wood pulp supply can be established to replace or supplement those sources affected by the current international situation. Spain's dependence upon foreign suppliers of wood pulp has long been a problem in that country and currently, Spanish newspapers have often found it impossible to secure ample newsprint. Government committees have taken steps to provide for reforestation and to create a domestic pulp manufacturing industry.

◆

▶▶▶ AN ENGLISH FIRM, Messrs. Thomas Tait and Sons, Ltd., of Aberdeenshire, submitted samples of paper made from oat straw recently to the British *World's Paper Trade Review*. It was stated that the sheets were of good color, bulk well and have a good look-through.

◆

▶▶▶ DURING RECENT YEARS MEXICO has reduced its production of paper as a result of the activity of the Mexican Government in bringing from Canada, Sweden and the United States, certain classes of paper. The local paper mills are now concentrating their attention on other paper of higher quality and have practically ceased the manufacture of newsprint and similar papers.

$70 + $1440 + $191 = $1701
saved on just 3 Machines

A PROMINENT PAPER MANUFACTURER found that blown fuses and motor burnouts were causing production to drag—and costing too much loss in man-hours, machine time and maintenance expense. By replacing fuses with Westinghouse Nofuze protection, on just three machines, they saved a total of $1701 a year . . . and here's the way they did it:

$70 HERE

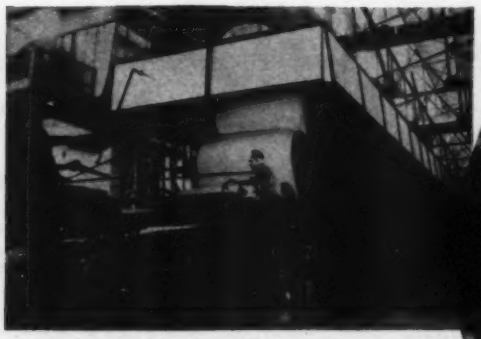
Every day, 3 or 4 fuses blew, 15 minutes lost each time, for 3 operators and 3 machines. Cost of lost man-hours alone — $1.35 per day — $70 per year, plus idle machine time. One ABI Breaker reduced it to estimated five minutes loss per day, with no maintenance.

$1,440 HERE

Any one of six motors burning out on this paper machine caused loss of $125 per hour machine time, plus $100 motor repair. Four times a year — the usual record — cost $1,440. All saved with Nofuze Breakers — not a motor burnout in 2½ years.

$191 HERE

The vertical pump motor used to circulate material through the sump frequently stalled due to overload. Workmen blocked the fuses, tried to force impeller with large wrench. Frequent result — burnt-out motor. Even at once a year, this cost $191 for repairs. But a Westinghouse Nofuze Combination Linestarter stopped the trouble and cost — permanently.



J-94086

Perhaps you could make similar savings, speed up operations, improve products, with modern electric drives. Westinghouse will help you check your plant. Just call the local office, or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Address Dept. 7-N.

Westinghouse

ELECTRICAL PARTNER OF THE PAPER INDUSTRY

ASSOCIATIONS

PACIFIC COAST SUPERINTENDENTS HOLD SUCCESSFUL MEETINGS

▶▶▶ MILL SUPERINTENDENTS to the number of well over fifty attended the fall meeting of the Pacific Coast Division of the American Pulp and Paper Mill Superintendents Association in Portland, Oregon. The total attendance was approximately 100, including factory representatives and others. The formal meeting was in the Portland Hotel, December 2. The previous day had been spent in visiting plants at Camas and Vancouver, Washington, and Oregon City and West Linn, Oregon, together with some golf and bowling.

Members of the association were much concerned over the fact that their chairman, E. W. G. Cooper of the Crown-Willamette Paper Company, Camas, could not be present. He was in a hospital in Vancouver recovering from a serious operation. Anton Siebers of the Longview Fibre Company, Longview, Wash., first vice chairman, presided.

Other officers of the division were Niles Anderson, of the St. Regis Kraft Company, Tacoma, second vice chairman and Albert S. Quinn of the Stebbins Engineering Corp., Seattle, secretary-treasurer. At this meeting, E. G. Drew, Drew & Hoffman Company, was committeeman in charge of registration; Don Shirley, Link-Belt Company, golf; Roy S. Carey, National Aniline Chemical Company, entertainment; William C. Marshall, Pacific Coast Supply Company, bowling; Nels G. Teren, stag breakfast. Mrs. Roy S. Carey was chairman of the Ladies' Committee.

George W. Craigie, field secretary of the National Association was present during the two days. A "Men Only" luncheon was scheduled for Saturday afternoon where Dr. Frank Munk of Reed College was to speak on the subject: "An Intimate Discussion of European Affairs."

Three formal papers were read at the Saturday morning session. Erik Ekholm, general superintendent of the Puget Sound Pulp & Timber Company, Bellingham, Washington, offered: "Practical Observations of Flat Screen Operation." Kenneth C. Logan, Pacific Mills, Ltd., Ocean Falls, B. C., described a method of "Testing the Wet Strength of Ground Wood." J. E. Goodwillie, of the Beloit Iron Works, Beloit, Wisconsin, had a paper on: "Paper Machine Design." He could not attend, so his paper was read by Vice Chairman Siebers.

Had Mr. Goodwillie been present to read his own paper, he would have heard the chuckles that went through the room over one of his opening paragraphs. His paper covered the last ten years of paper mill design. "Ten years ago, in the Portland area," he said, "Weyerhaeuser Pulp in Longview was just beginning. The rebuilding plan at Camas was just completed. The second machine at St. Helens had been running only a short time. Franklin Roosevelt was living in Albany with the title of Governor of New York and Adolph Hitler was living in Munich with no title at all."

His paper then went on to say that despite the fact that business had been depressed generally during that period, it had not stopped progress in design. In the class of newsprint machines, only two new machines had been put into operation. But in the class of magazine stock machines, speeds had been increased from 350 to 400 feet to 500 to 700 feet, and stock can now be coated on both sides. Kraft paper that was run at 800 to 900 feet in 1930 can now be turned out at 1200 to 1300 feet. There have also been rapid strides in bleaching kraft pulp.

In the field of rubber-covered suction presses, there are now over 350 in operation. The first dual presses came in during the period, with about 40 in operation now. The first section drum press came out during 1935, with 45 now in operation. So, in spite of conditions attendant upon national economy, much has been done to better the products and increase capacities.

Erik Ekholm explained that in flat screen operation, degree of cleanliness must be balanced against cost of operation. Speed, length of stroke and consistency of stock are the chief variables affecting the operation of such screens. He then went on to describe tests their company has made to determine the best operating combination. These were not laboratory tests but tests made in the plant under operating conditions.

Kenneth Logan described an original piece of apparatus, not too hard to construct, which they had been using for almost three years to test the strength of wet groundwood. He said they had done this because they needed the data and there seems to be little if any printed data on the subject. In the discussion, he said that it has been observed during tests that the sheets enter the dryer with less than one-twentieth of the strength they have after drying. There seems, however, to be very little definite relation between wet and dry strength for various classes of materials.

Election of officers resulted in Anton P. Siebers succeeding to the chairmanship, Niles M. Anderson advancing to first vice chairman and M. E. Norwood, superintendent of the Columbia River Paper Mills, Vancouver, Washington, being elected second vice-chairman. Albert S. Quinn continues as secretary-treasurer.

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CONVENTIONS AND COMING EVENTS

Jan. 22-26—Sixth International Heating and Ventilating Exposition, Lakeside Hall, Civic Center, Cleveland, Ohio.

Feb. 19-22—American Paper and Pulp Association, Annual Meeting, Waldorf-Astoria, New York City.

Feb. 19-22—Technical Association of the Pulp and Paper Industry, Annual Meeting, Roosevelt Hotel, New York City.

April 1-6—Coastal Empire Paper Festival, Savannah, Georgia.

May 19-20—National Paper Box Manufacturers Association, Twenty-Second Annual Convention, Coronado Hotel, St. Louis, Missouri.

Oct. 7—National Safety Congress and Exposition, Stevens Hotel, Chicago.

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Convention Papers . . . Abridged

The papers presented at the fall meeting of the Technical Association of the Pulp and Paper Industry, Syracuse, New York, September 12, 13, and 14, 1939, have been digested and are so published. The first and second installments appeared in the October and November issues respectively. This concludes papers digested from that meeting.

The Effect of Particle Size on the Efficiency or a Rosin Suspension as Measured by the Retention of Rosin and the Degree of Sizing Imparted to Paper

FIRTH DENNETT[1] and C. E. LIBBY[2]

The present paper deals with the development of a suitable sizing procedure, and the determination of the effect of the dimension of the free rosin particles on the degree of sizing.

In order to insure the possibility of reproducing results, and to eliminate as many of the variables as possible, pure abietic acid, high grade alpha pulp, C. P. aluminum sulphate, and distilled water were used throughout the work except in the development of the procedure and in a few runs made with commercial materials.

The size suspensions were prepared by making an approximate 2.5 per cent suspension of 60 mesh abietic acid in a 0.5 per cent gelatin solution and running it through a Manton-Gaulin colloid mill at different clearances of rotor and stator, and for varying lengths of time to obtain the desired particle size.

A small amount of the gelatin solution was mixed with the abietic acid until the acid appeared thoroughly wetted. The remainder of the gelatin solution was added in about 50-cc. portions with constant stirring by hand. The mixture was then agitated with an electric stirrer for about five minutes before portions were taken out for use in the colloid mill. After preparing the suspension, the foam was allowed to settle, and 2-cc. samples were taken and dried over night in an electric drying oven to determine the exact concentration of the abietic acid, allowance being made for the gelatin present.

When the size suspension was added to the beater, a sample was also taken for use in the determination of particle size by the use of the Zeiss Siedentopf cardioid ultramicroscope.

In order to determine particle size, the number of particles in a volume of known concentration had to be counted. Surfaces of a definite area were separated from their surroundings with the aid of Ehrlich eyepiece stops placed in the ocular lens of the microscope.

The cardioid condenser of the microscope was removed from the substage so that light would pass directly to the objective. Special objective "V" (n.a. 1.0, 60x) and eyepiece K_2O were used. A Zeiss stage micrometer (0.01 mm. divisions) was placed on the stage and brought into focus and the openings in several of the Ehrlich stops measured by comparing them with the divisions on the stage micrometer.

Since the success of the problem at hand depended on a consistent sizing procedure, much consideration was given to this phase of the work.

A procedure was developed in much the same manner as suggested by Dreshfield, Haggerson, and Heller in their work of size evaluation.

A 1.5 pound Niagara beater of the type used in making pulp strength tests by the standard TAPPI method was employed in the beating and sizing operation. The sheets were made on a British standard sheet machine which had been fitted with a sump large enough to hold the white water from one sheet.

In couching the sheets, felts soaked in white water were used instead of blotters to insure as little removal of rosin from the sheet as possible. Six sheets with their couch felts and press fillers were placed in the British standard press and the pressure raised to 50 lb. and released immediately.

In developing a method for drying the sheets a small electric drying oven was used. Several runs were made in which sheets were dried at temperatures ranging from 105 to 140 deg. C., and for time intervals ranging from thirty minutes to three hours. From these results the temperature range between 110 and 120 deg. C. was chosen for all succeeding work, since it more nearly represented mill conditions. Six sheets were placed on drying rings and dried at one time in the oven for an hour. Circulation was obtained in the oven by means of a small fan mounted on the inside wall.

The sizing values were obtained by use of the Valley size tester, the average of three size tests per sheet being recorded.

Size retention was determined by the method developed by Launer using an extracting solution consisting of 4 ml. of concentrated hydrochloric acid to one liter of ethyl alcohol.

From the results obtained, it was apparent that there was a definite drop in the sizing value when suspensions above a certain particle size were used. In suspensions containing particles less than 400 millimicrons in radius, the particles usually showed some motion for a time under the ultramicroscope, and the original method of counting only those which were moving was sufficiently accurate. Above this size some of the larger particles precipitated rather quickly on both the top and the bottom of the counting cell, thus making it necessary to count those which had precipitated in order to obtain the greatest accuracy, which at best was subject to some error.

Irrespective of the manner in which the rosin was held to the fiber, the particle size did have a definite effect upon the sizing value in free rosin suspensions. Furthermore, the results indicated that sizing comparable to that obtained from commercial rosin sizes could be obtained with a 100 per cent free suspension of a rosin acid without the aid of an alkali.

Several runs were made with commercial materials using the procedures outlined for the work above, in order to obtain data comparable to that obtained with abietic acid suspensions.

"H" grade rosin suspended in gelatin in the same manner as the abietic acid was found to have 83 per cent of the sizing efficiency of an abietic acid suspension of the same particle size utilized under the same conditions.

A sample of Bewoid size, containing 80 per cent free rosin, showed about 88 per cent of the sizing efficiency of an abietic acid suspension having approximately the same size of free rosin particle.

A nearly neutral size gave values only 60 per cent as high as the Bewoid suspension and 70 per cent as high as the "H" grade rosin-gelatin suspension. This showed that the high free rosin sizes gave much better sizing results with the same amount of alum consumed.

(1) Dow Chemical Company, Formerly Graduate Assistant N. Y. S. College of Forestry.
(2) Professor of Pulp and Paper Manufacture N. Y. S. College of Forestry.

The Fluorescence Size Test, an Improved Method and a New Instrument for Measuring the Water Resistance of Paper

J. A. VAN den AKKER[1], PHILIP NOLAN[2], A. C. DRESHFIELD[3], and H. F. HELLER[4]

Feeling that the TAPPI dry-indicator and other existing tests left much room for improvement, the Paper Makers Chemical Division of the Hercules Powder Company and The Institute of Paper Chemistry entered upon a co-operative research, sponsored by the former, the objective of which was the development of an improved size test. It is the purpose of this article to present the more important results of this work.

Work leading to the present fluorescence size test started with the Grant modification of the dry-indicator test. Grant prepared a fluorescent indicator composed of a 0.5 per cent dry mixture of rhodamine 6GX dye in powdered sugar.

It seemed clear from our initial tests that this indicator was objectionably sensitive to water vapor. Qualitative tests verified this objection.

The dependence of the Grant test on water vapor was strikingly shown by a series of determinations in which the percentage of rhodamine 6GX in the mixture of this dye and powdered sugar was varied through wide limits.

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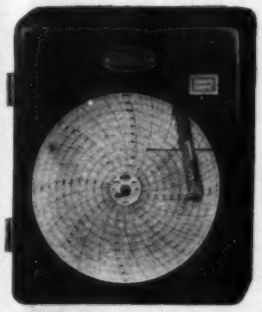

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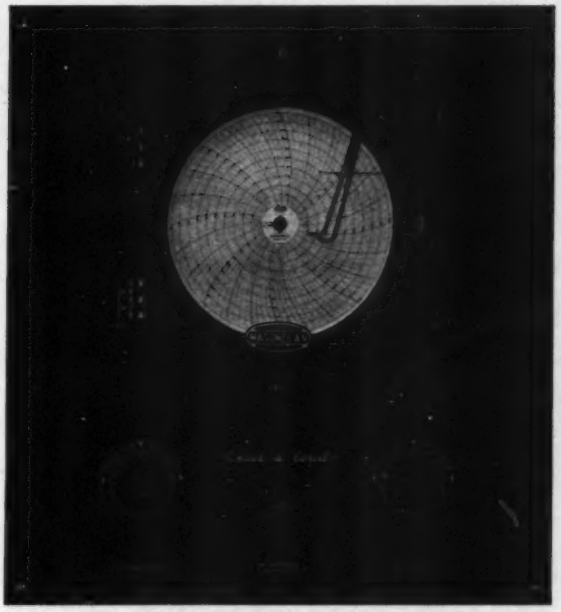

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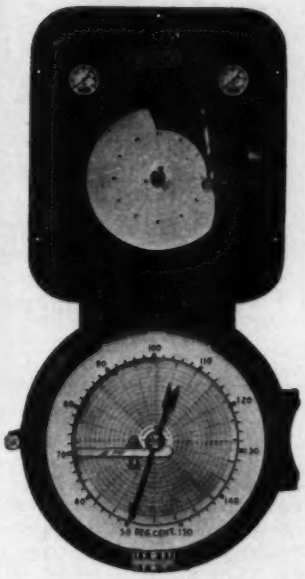

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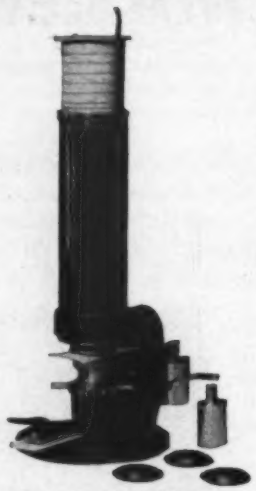

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During the course of an F. S. T. determination (Fluorescence Size Test), which is carried out in the dark, or in a small box equipped with a slot for viewing, nothing except the feeble fluorescence of the test specimen and the dull red fluorescence of the dye is seen until a short time prior to the end-point, when a number of isolated points or "stars" of brilliant yellowish color become clearly visible. At the end-point, these "stars" become very numerous, and, more important, the surface brightness over a substantial portion of the treated area becomes rather uniform.

After a number of F. S. T. times had been obtained with the rhodamine 6GX dye, it became apparent that, for certain hard sized papers, the end-point was almost too weak to be satisfactory, and, in the case of one slack sized paper, no end-point whatever was visible. In view of these findings, a number of dyes were investigated. The requirements laid down for a satisfactory dye were:

The indicator must give a satisfactory end-point on all papers.

The end-point fluorescence must be bright.

The dye must exhibit the concentration effect, i.e., the end-point must not be appreciably affected by transmitted water vapor.

The change in color of the fluorescent light must be decisive.

The end-point must be as sharp as possible, consistent with the known irregular way in which transudation of paper takes place.

The end-point fluorescent color should preferably be different from that of most papers.

A dye which appears to meet these requirements very satisfactorily is uranine B (Heller and Merz). The end-point fluorescence is a bright yellow of very high intensity, and the fluorescence of the dry dye is like that of the rhodamine 6GX, a very dull red. Uranine B is hygroscopic and must, therefore, be kept in a dry atmosphere to keep the dye in a fluffy condition and to prevent agglomeration of the particles. The dye can be placed in an open container, however, if an incandescent lamp or small electric heater is used to keep it warm.

Because of the hygroscopic nature of uranine B dye, careful tests were made to ascertain the influence of water vapor on the end-point. All tests have shown or indicated that the influence of water vapor is inappreciable.

Perhaps the most convincing evidence favoring the view that the uranine B end-point is not affected by water vapor is obtained by microscopic examination of the surface of a hard sized specimen by fluorescent light during the transudation of water. Until the end-point commences, virtually no characteristically bright fluorescent light is observed. During the end-point stage, however, individual fibers can be seen to light up rather suddenly with the characteristically bright fluorescence; in the space of about a second, the brilliantly fluorescing solution can be seen to travel down the length of a fiber. It is evident that this phenomenon occurs when the advancing water meets the superficial fibers of the sheet.

It should be emphasized that the amount of dye applied to a test specimen is very small. In the earlier tests where the visual end-point was used, it is estimated that the amount of dye applied was only of the order of 10 micrograms per square centimeter. The weight of dye applied was measured by spectrophotometric means.

The TAPPI and visual F.S.T. size times are in rough agreement where the latter are smaller than about 30 seconds. As one would expect, the difference between TAPPI and F.S.T. size times decreases as the degree of size increases, and passes through zero in the neighborhood of 30 to 40 seconds, and then increases fairly rapidly in the negative direction as the F.S.T. size time increases.

An attempt was made to correlate differences between the F.S.T. and TAPPI size times with water vapor permeability. A very rough but definite correlation was found, in which an increase in F.S.T. size time was accompanied by an increase in water vapor permeability when the change in TAPPI size time was inappreciable, and, when the change in F.S.T. size time was nil, an increase in TAPPI size time was accompanied by a decrease in water vapor permeability. It was felt that better correlation would have been obtained if the Vapometer method had been more sensitive to differences in permeability of nonmoistureproof papers.

Experimental equipment was devised which would permit the operator to arrive at the F.S.T. size time through measurement of the intensity of the fluorescent light.

A considerable amount of work with the laboratory model led to the final design of the photoelectric fluorescence recorder. The outstanding feature of this instrument is its almost complete freedom from personal error. After applying the dye to a specimen, the operator places the specimen in a sample holder and covers it with a flat cover glass. He then presses a lever, and the water cup rises automatically to bring the free water surface in contact with the specimen the upward rise of the water cup is damped with a small dash pot. When the water surface meets the specimen, the synchronous motor which drives the chart paper starts automatically. All that the operator must do is to turn the hand wheel to follow the galvanometer deflection.

(1) Research Associate, The Institute of Paper Chemistry (2) Research Assistant, The Institute of Paper Chemistry (3) Director of Operations, Paper Makers Chemical Division, Hercules Powder Company (4) Paper Makers Chemical Division, Hercules Powder Company.

Effect of Filler Brightness On Lined Board Brightness

W. R. WILLETS, R. T. BINGHAM and L. H. ERIKSEN

Titanium Pigment Corp. Paper Development Laboratory, New York City

In a previous paper ("Factors Affecting Lined Board Brightness" by W. R. Willets, R. T. Bingham and L. H. Eriksen, presented at the Annual Meeting of TAPPI, February, 1939), it was shown that the brightness of a lined board having a filler (middle) of constant color and brightness is dependent on the opacity and brightness of the liner sheet. It also was noted that the brightness and color of the filler to which the liner is applied would probably affect the ultimate brightness and color of the lined board, as it is more difficult to "cover" a filler of low brightness than one of higher brightness.

The present report deals with the effect of filler brightness on ultimate board brightness, under varying conditions of liner sheet opacity and brightness. The data are confined to single ply top liner, although it is recognized that many products are made with sub-liners. However, the indications noted probably would hold true regardless of whether or not a sub-liner was used.

The liner stock consisted of purified bleached sulphite, lightly beaten, which was prepared in batch lots for each run.

The filler stock consisted of varying proportions of old newsprint and bleached chemical pulp. By regulating the proportions, it was possible to vary and control the brightness of the filler.

Three runs were made using liners of different weights (about 78, 56 and 38 pounds, 25 x 38 — 500). Each liner weight was made unpigmented, and pigmented with 1, 2, 3 and 4 per cent titanium ("Titanox"-A). Lined boards were made combining the various filler and liner variations.

The liner sheets were tested for opacity and brightness, while the boards were tested for brightness. A Bausch & Lomb opacity meter was used for making these tests.

...nt, ash and titanium dioxide ... the liner sheets also were deter-...

The results indicate that as the brightness of filler increases for any given liner condition, the brightness of the board increases. This is more pronounced if the liner sheet opacity and brightness are in the lower ranges, resulting in lower ranges of board brightness.

The effect of filler brightness on ultimate board brightness may be a very important factor in some cases where a mill is using a widely varying old paper furnish for its filler stock. It has been noted that even in boards which had the same liner furnish, thickness, etc., there was a distinct difference in appearance because of the difference in the brightness of the filler underlying the liner.

Pigmentation makes it much easier to cover a dull filler than if an unpigmented liner sheet is used. For example, using a light weight liner, about 0.8 per cent titanium dioxide in the liner sheet gave as good board brightness on a filler having a brightness of 38.3 per cent, as did an unpigmented sheet on a filler having a brightness of 55.1 per cent. When a much heavier liner was used, a liner sheet containing about 1.6 per cent titanium dioxide, on a filler of 39.6 per cent brightness, gave as good board brightness as an unpigmented liner on a filler of 75.5 per cent brightness.

A consideration of the data on the effect of filler brightness, and of liner opacity and brightness, on the ultimate brightness of lined boards, indicates that probably more can be accomplished by increasing liner opacity and brightness than by increasing filler brightness.

A Study of Calcium Carbonate, Clay, and Casein Coating Mixtures Affecting Certain Sheet Characteristics

A. E. HUGHES[1] and H. F. RODERICK[2]

The clay employed in the investigation is representative of a grade widely used in the coated paper industry, and it is believed that the results obtained with this material will not be far different from what one might expect to find in actual mill practice.

The grade of calcium carbonate employed is representative of a precipitated grade prepared specifically for coated papers, and it is a dried product.

The casein used was a granular material and it is representative of the average grades employed by most coating mills.

The coating colors prepared were:

- 100 per cent clay with 5 to 40 parts of casein.
- 100 per cent calcium carbonate with 5 to 41 parts of casein.
- 50 per cent clay and 50 per cent calcium carbonate with 16 parts of casein.
- 75 per cent clay and 25 per cent calcium carbonate with 16 parts of casein.
- 90 per cent clay and 10 per cent calcium carbonate with 16 parts of casein.

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The coated papers were prepared on a single sheet laboratory coater which has been developed recently. An excess of coating color was brushed onto the felt side of the raw stock, and after 30 seconds contact the excess coating was removed by passing the paper under a doctor blade, which had been previously set to a clearance which would allow the desired amount of coating to remain on the paper. The amount of coating applied was 16 pounds ± one-half pound. After coating, the papers were air dried and conditioned for a period of 24 hours. Necessary test sheets were calendered by a paper mill on a regular calender stack and all sheets were finished under the same conditions.

Standard methods and procedures were relied upon entirely in evaluating the coated sheets: Wax Tests (with Dennison Waxes); Ink Receptivity (with K and N ink); Smoothness (on a Bekk smoothness tester); Finish (measured by a B. and L. gloss meter); Opacity (determined by means of a B. and L. opacimeter); Bright-opacimeter); Color Analysis (obtained with ness (measured by means of a B. and L. a visual spectrophotometer).

The wax picks of clay coatings with increased casein content is far different from those prepared from calcium carbonate. The casein requirement of calcium carbonate is, in general, greater than it is for most clays.

The difference in casein requirement of clay and calcium carbonate decreases in the range of higher wax picks. The requirement of both clay and calcium carbonate for 11 to 12 wax is around 35 to 40 per cent casein, and little difference can be noticed in the wax pick regardless of the pigment employed. It would appear that in the preparation of high wax pick sheets, one could use either pigment since little or nothing would be realized in casein savings.

The effect of calendering is a general lowering of the wax pick over the entire range studied. There is less lowering of the wax pick on the calcium carbonate coated sheets than on the clay coated sheets.

If we disregard the differences in wax pick, it appears that calcium carbonate coated papers are much more receptive to ink than are the clay coated sheets.

Smoothness of the uncalendered calcium carbonate sheets is generally superior to that of the clay coated sheets. Smoothness of both materials is about the same magnitude after calendering. A noticeable decrease in smoothness is evident as the wax pick increases.

Decrease in gloss of the clay coated sheets with increased casein content is much more rapid than it is in the calcium carbonate coated sheets.

Titanium dioxide has the highest opacity of the materials tested; calcium carbonate is not far below titanium, and clay has a lower opacity than calcium carbonate. All of the pigments tested show a decrease in opacity with increased percentages of casein. The decrease seems to be greater for the pigments having lower original opacities.

The difference in brightness between the titanium and calcium carbonate coated sheets is not very great. The clay coated sheets are low in brightness, compared to those prepared from titanium and calcium carbonate.

The effect of calendering is hardly noticeable on the calcium carbonate coated sheets, while calendering lowers the brightness of the clay coated sheets almost two points.

An effect of calendering is a decrease in the brightness of coated papers. This minimizes the color advantages obtained by the pigment, unless the pigment resists this blackening effect. The amount of blackening decreases as the amount of calcium carbonate in the coating pigment is increased. The loss of brightness when the pigment contained entirely calcium carbonate is comparatively small, and this resistance to blackening by calcium carbonate is proportionately realized in the pigment blends with clay. The calcium carbonate not only improves brightness by its color effect, but also retains the brightness to a greater degree.

(1) Michigan Alkali Company. (2) Research Chemist, Michigan Alkali Company.

Microbiological Control in Pulp and Paper Manufacture

R. B. MARTIN and A. E. GRIFFIN
Wallace & Tiernan Company

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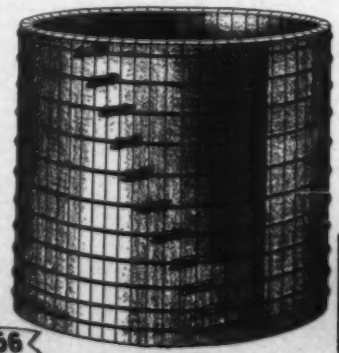
(Continued on page 1002)



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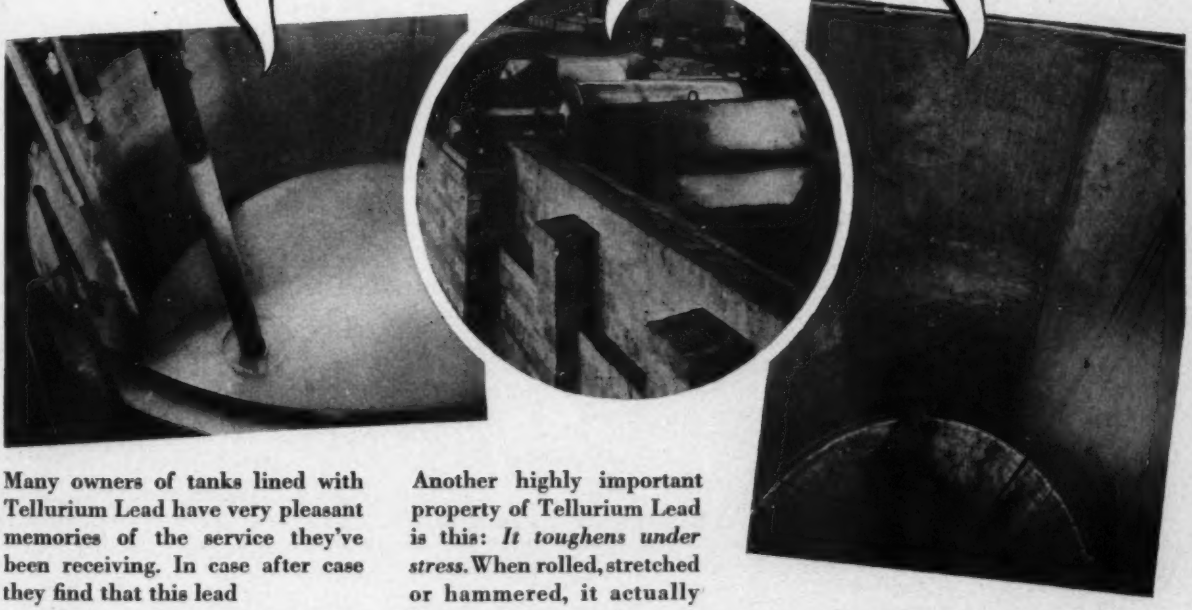

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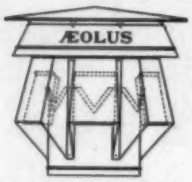

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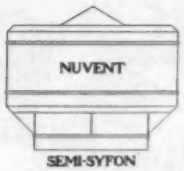

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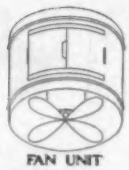

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(Continued from page 998)

service water lines, and elimination of process difficulties formerly due to unfavorable condition of their water supplies. In 1924 a paper mill in Michigan instituted chlorination of fresh water. The mill had suffered from a run of discolored paper and other operating difficulties and had traced these difficulties to the fresh water lines and to a well supply that was later recognized as being infected with so-called iron bacteria. It has been since demonstrated that although relatively few organisms are present in such a water, they represent a source of infection that results in large accumulations of slime in pipe lines and in systems into which this water is later introduced.

There are many different forms of slime accumulations. More recent investigations have shown that these are caused by a multitude of types of micro-organisms. Fresh waters commonly carry organisms of the filamentous iron bacteria group, the algae, certain of the fungi, and various types of capsulated and non-capsulated bacteria, all of which influence the form of slime accumulation that will be found in the fresh water lines and in the various parts of the mill system.

Usually temperature conditions in the mill system and food materials available are somewhat more suitable for growth and reproduction of the filamentous iron bacteria types of slime-formers than are those in the fresh water lines. Permitting entrance of such slime-formers to the mill results in serious production difficulties.

Green and blue-green algae are most troublesome in mill operation through their accumulations breaking away to clog filters, screens, showers or small lines, either alone or in combination with active live growths of other slime-formers. To only a minor degree do they grow and reproduce in the mill system, to form further slimes in open stock and white water tanks, flumes, or flow boxes.

Unlike the algae, the fungi find the average pulp or paper mill system a most advantageous environment, pH and temperature conditions being ideal for active growth, and food material being available in abundance.

Practically no section of the mill system is proof against the wasteful and troublesome activity of the capsulated bacteria. They consume, decompose, or otherwise destroy papermaking materials, in their life processes, forming as waste products troublesome slimes in or on the mill equipment, spotting or discoloring the finished papers, and contributing generally to difficult and costly mill operation.

To some degree the non-capsulated bacteria may be no less troublesome. They also consume paper materials, developing objectionable odors and causing discoloration of the paper.

Thus far, fresh water only has been considered as a source of slime infection of the pulp or paper mill. Certain of the fungi will enter the mill with solid papermaking materials, usually the fibrous but occasionally the non-fibrous.

In addition, certain of the fungi are airborne, and enter the paper or pulp system, or infect stored pulp and other materials in that manner.

Up until 1930, with mills operating fairly universally with open systems, the problem of obtaining adequate treatment for slime elimination was a relatively simple matter, through the application of chlorine directly to the general fresh water supplies of the mills. Occasionally a slime development defied efforts to obtain control through simple fresh water chlorination. In those cases, study demonstrated that contamination was being introduced with the papermaking materials.

By 1930 an increasing number of mill problems defied the efforts made to obtain microbiological control through simple chlorination. This situation resulted in the adaptation of the chloramine treatment as developed for the treating of drinking water to these problems. Since that time a wealth of knowledge has been obtained concerning the nature of chloramine reactions in paper mill water treatments, and as to the suitability of either simple chlorination, or one of the many variations of chloramine usage, in the handling of any specific problem of water treatment.

It is generally recognized that the reaction of chlorine with ammonia to form chloramines acts to retard the combination of chlorine with the organic matter in solution or in suspension in the water being treated. This, therefore, amounts to establishing a selective activity of the chlorine, by limiting its oxidizing power while extending its bactericidal powers.

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The selective feature of chloramine treatment has been of most importance in controlling slime and similar difficulties in those types of production that failed to respond to the earlier uses of simple chlorination. Principal among these are the groundwood and newsprint papers, straw, kraft, and similar paper products. Even though in isolated cases, chlorine alone had performed reasonably well, the supplementary uses of ammonia for chloramine formation and extension of sterilization treatment made possible through carefully planned chloramine applications, enabled these and other mills to secure further production savings more economically than had been possible with simple chlorination.

Very familiar are the improvements in quality of finished papers through elimination of slime spots, general discoloration, pin holes, and objectionable odors. Equally familiar are the savings in materials, power, heat, labor and production time losses, made possible through maintenance of slime-free machine systems, whether open systems or closed.

In the years since 1930 the uses of chlorine and of chloramines have been extended to more than three hundred mills, handling essentially the entire list of the many different pulp and paper products. Each mill has presented its own particular problems, and each new experience has better fitted the paper industry to cope with the increasingly stringent requirements involved in the manufacturing and handling of papers designed for use in food packaging.

The Advantages of Microbiological Control in Pulp and Paper Manufacture

J. R. SANBORN
N. Y. Agricultural Exper. Sta., Geneva, N. Y.

The pulp and paper industry is acquiring a research background which makes possible the production of more useful and efficient paper products.

Investigations of suitable paper products for food packaging require co-operative research on the physical, biochemical and microbiological properties of wrappers and containers, considered in relation to the physical biochemical and microbiological condition of the foods to be packaged. Knowledge of the specific properties of foods with respect to gaseous exchange, evaporation of excessive or condensed moisture, elimination of aromatic compounds, and exudation of liquid products, will enable the technical staff to determine specifications for suitable wrappers and containers which will prevent or effectively delay undesirable changes in packaged foods.

The logical approach to these problems is, first of all, to secure cleanliness and adequate microbiological control during pulp and paper manufacture. Such a program not only results in products of high sanitary quality and uniformity, but also enables mills to effect economies which, in nearly every case, can be shown in concrete form.

Several newsprint mills reveal general slime conditions caused by unusually persistent and aggressive types of micro-organ-

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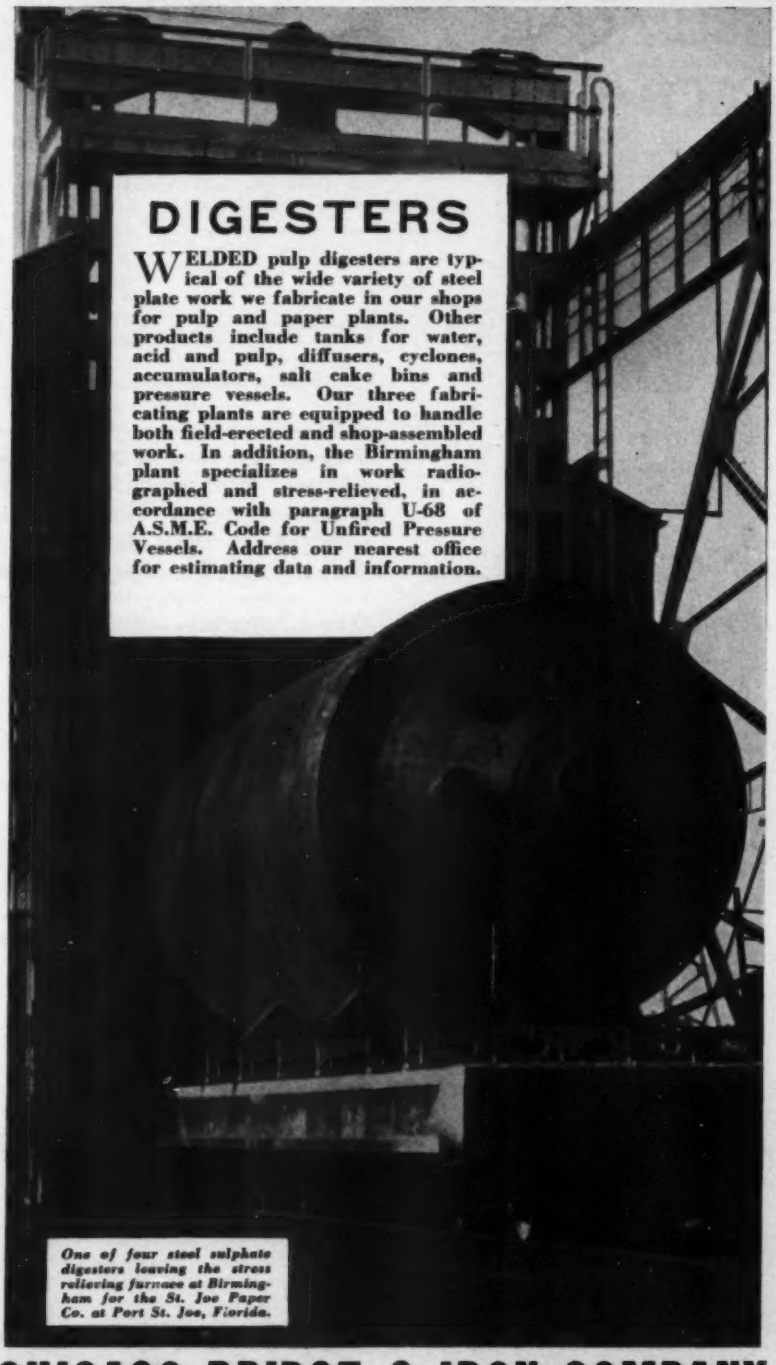
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isms that have been allowed to establish themselves without restraint. Under these conditions, bacteriological counts of paper machine white water frequently vary from 250,000 to 10,000,000 organisms per cc. on standard nutrient agar with incubation at 37 deg. C. for 48 hours.

Other news and low grade specialty mills have endeavored to eliminate undesirable contamination and many causes of trouble through consistent bacteriological control. Counts at these mills are often as low as 1,000 per cc. and are seldom in excess of 50,000. Under strict bacteriological control some of these mills and many others manufacturing high grade products are able to maintain counts in the pulp stream and suction box or cylinder vat white water that are less than 1,000 per cc., often less than 250 per cc., and sometimes approaching essential sterility. These mills invariably report, as a result of microbiological control, increased yields and decreased maintenance costs.

There is another important aspect of microbiological and sanitary control among pulp and paper mills. Suitable raw materials must be selected for the production of suitable wrappers and containers.

In the case of paperboard for milk and milk products containers, uncontaminated chemical or mechanical pulps should be employed, that have been manufactured into paperboard under adequate bacteriological control.

For fiber containers and wrappers for less perishable or less easily contaminated foods, such as frozen desserts, fish and meat products, bakery products and some dried foods, it seems fair to specify that stock should be composed of fibers which have received adequate bactericidal treatment, under approved conditions of sanitary control and which have not previously been exposed to, or in contact with, sources of undesirable contamination and which contain no material, either toxic or non-toxic, which will deleteriously affect the flavor, odor, composition or bacteriological quality of food products.

The purpose of the microbiological and sanitary mill survey is to reveal to the mill sources of undesirable and troublesome contamination and other conditions that may endanger quality production or cause economic losses and to suggest methods of controlling and preventing such troubles.

A satisfactory sanitary program includes the following general features:

1—Selection of suitable fibers and sanitary specifications for raw materials.

2—Purification of water supplies.

3—Clean, dry storage for pulps and raw materials.

4—Cleanliness of mill and elimination of all waste and residual matter.

5—Adequate bactericidal treatments of pulp system.

6—Bactericidal treatments of returned white water.

7—Effective water box sanitation.

8—Sanitary protection of finished paper.

Detailed procedures involved in a sanitary program are generally specific for each mill and must be considered in the light of local conditions. Determinations of these procedures and recommendations pertaining thereto are the functions of the sanitary mill survey.

It would seem desirable that the technical staffs of mills possess workers and facilities which will enable each establishment to maintain its own microbiological control. The mills should also have knowledge of the various uses for paper products and be able to suggest and utilize procedures for increasing their efficiency and usefusness.

Papers presented at the Twenty-eighth annual congress of the National Safety Council, Atlantic City, N. J., October 16-20, 1939, have been digested and are so published. This is the final installment. Other digests from that meeting appeared in the November issue.

Hand Injuries—their Cause and Prevention[1]

JAMES J. PLZAK, Claims Manager,
Consolidated Water Power & Paper Co.

The speaker described the intricate yet delicate anatomical structure of the hand, pointing out that there were 29 bones in the hand, numerous tendons, and nerves, all of which were beautifully patterned, flexible, and perfectly articulated.

He then divided his talk into three main parts: Types of injuries, causes of injuries and prevention of injuries.

In discussing types of injuries, he included: cuts, burns, fractures, infections, squeezes, and dermatitis. In discussing these points, the speaker brought out that it is necessary to be alert in investigating injuries. Deep cuts, although appearing minor on the surface, might involve tendons and nerves which later might cause considerable permanent disability to the injured. It was brought out that the procedure in treating burns should be followed very carefully to avoid loss of function due to scar tissue after healing has taken place. Under the subhead of infection, the speaker stressed the need to suspicion every hangnail as a potential source of infection. Infections to bones, tendons or sheaths were classed as perhaps the most severe disabilities to hands. Consultation with specialists in this field was recommended.

The second part of Mr. Plzak's address was devoted to causes which result in the types of injuries covered earlier in his talk. Mr. Plzak pointed out the various causes of cuts, such as tools, slitters, doctor blades, saws, etc., and then took up the subject of burns showing how they result from steam, acids, and electrical equipment. Under the classification of fractures, Mr. Plzak discussed handling materials, revolving machinery, falling, and falling objects, while under infection he spoke on bumps, felons, hang-nails, inadequate first aid, and miscellaneous subjects.

Mr. Plzak spoke at length on the subject of dermatitis or occupational dermatosis, pointing out that the causes of this disease or pathological condition of the skin were resultant from: (1) race, (2) perspiration, (3) age, (4) sex, (5) diet, (6) seasons of the year, (7) cleanliness, (8) hypersensitivity and (9) allergy.

It was brought forth that individuals with blond complexions are more susceptible than those with dark skins and that men are more susceptible to the disease than women. The younger employee or the newer employee on the job is more susceptible than the older one.

The third part of Mr. Plzak's address had to do with the prevention of hand injuries in which he discussed proper and adequate guarding, hunting out the latent hazards, watching the jobs, instructing foremen to do job analyses and be on the alert for latent or hidden hazards. Standard operations including job analyses are not of much good, the speaker said, if they are not followed up. Mr. Plzak stressed the fact that there should be adequate consideration of the fitness of the employee for the job that he is to fill, including mental examinations. The employee should be given a very definite educational program in connection with the job he is to do, the speaker said.

DISCUSSION

One member cited the importance of the hand accident problem and related six in-

[1]Mr. Plzak did not present a formal paper at the session but rather spoke from notes in an extemporaneous manner. This abridgement is an outline of his talk and touches only upon the highlights.

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stances of hand injuries. He asked if other members had any ideas of how to reduce these accidents. One member asked if any plants had any kind of a rule about the diameter of a paper roll before a man can place his hand on it. Two members stated that their companies had rules but that they, the workers, had been lax in obeying them.

One member cited three things that prevented foot injuries in the woods. They are: (1) proper procedure before tree is cut, (2) safety shoes, and (3) eliminating men who are not actually lumberjacks.

Another member stated that ladders on the machines, welded where the men use them most, have helped prevent hand accidents. He also stated that a liquid green soap and water has reduced infection. Button controls on machines are also of aid.

In answer to a query about cleaning guards, the original speaker explained that his workers used a safety glove . . . with fingers free but hand protected.

Compensation rates for woods injuries were discussed, the rates in various states being brought forth.

A member then brought up the point of the importance of checking testing tools before being used, citing an instance when a serious accident occurred because a worker had not checked his fuse tester. The speaker advocated periodic inspection.

It was stressed that safety, as much as anything, should be a part of every worker's job.

Value of Accident Statistics

F. W BRAUN, vice president,
Employers Mutuals
Wausau, Wis.

The year 1938 was an outstanding one in accident experience in the Paper and Pulp Section. Injury rates averaged 15.33 for frequency and 1.18 for severity, according to reports from 244 organizations which worked 185,000 man-hours during the year. While last year's frequency rate is above the average for industry as a whole, the severity rate is considerablay below the general average.

Our injury rates do not entitle us to a place among the low-rate industries, but our mills and factories do have one of the best records of improvement during the last twelve years. Reductions in injury rates over 1937 were especially large, being 26 per cent for frequency and 48 per cent for severity. The Section had an exceptionally low fatality frequency rate during 1938 and the frequency and severity of permanent, partial disabilities were also much lower than usual. These results, combined with improvement in previous years, give total reductions of 72 per cent in frequency and 69 per cent in severity since 1926. . . .

Small plants, on the whole, have not kept pace with large ones in reducing injury rates, particularly in severity, during the last six years. For 1938 frequency rates in large units averaged 30 per cent below the rates of small mills. . . .

Injury rates for the handling and storage of raw materials and paper and board making were particularly high during 1938, being above 24.0 for frequency and 17.0 for severity. . . .

According to this experience (reports on almost one-half of the serious injuries) serious injuries occur principally in the operation, repair and adjustment, feeding, etc., of machinery. . . .

Analysis discloses six outstanding unsafe acts by employees who were involved in the occurrence of 139 serious injuries during the last two years. Employees often failed to grip, hold or lift objects properly . . . second in importance was the unsafe use of tools and equipment . . . the third outstanding unsafe act was arranging, placing overloading or otherwise handling or working with materials or objects unsafely . . . a large number of injuries result from members of the body being caught in or between moving parts of machinery . . . failure to give or get the proper signal when starting or otherwise operating equipment and failure to tag, lock, block or secure vehicles, switches, and similar equipment against unexpected motion are important faults . . . the sixth principal unsafe act was failure to wear goggles, safety shoes, and similar protective attire.

The outstanding mechanical causes were unsafe processes, working methods, planning and poor housekeeping . . . lack of or inadequate guarding was second in importance . . . the other outstanding mechanical cause was defective tools, machines, and equipment. . . .

Knowing the important causes the question naturally is "What can be done about them?" The causes suggest certain steps. For example, closer inspection, proper maintenance, and a check of the design and construction at the time of purchasing new equipment are measures for eliminating accidents due to defective equipment.

Considering personal causes: improper attitudes, particularly disobeying instructions, abstraction, recklessness and haste; were of most importance, being assigned to 45 per cent of all injuries.

Numerous unsafe acts also arise out of unawareness of safe practices and lack of knowledge or skill. Causes of this type figured in 36 per cent of the serious injuries. Job analysis and training with special attention to outstanding unsafe acts are remedies suggested by these causes.

New Ideas on the Use of Salt Cake in Kraft Pulp Mills*

WALTER L. SAVELL, Manager
Technical Service Division
The Mathieson Alkali Works (Inc.)

The kraft process is the result of some experimental work done by C. F. Dahl. This work was done in Danzig; and salt cake was used as a source of alkali.

At the time Dahl carried out his work (1879), salt cake was available in large quantities, a by-product of the production of muriatic acid and at that time still an intermediate product in the production of soda ash by the Le Blanc process.

While the Le Blanc process is no longer operated commercially, there is still a certain amount of salt cake produced as a by-product in the manufacture of muriatic acid. The supplies available from this source, however, are not sufficient to take care of any more than a small fraction of the present demand.

Since Dahl's original observation, many scientists and technical workers have contributed data resulting from studies on the composition of the kraft cooking liquors. These liquors are known to contain two active ingredients. One is sodium sulphide and the other is sodium hydroxide (caustic soda).

Remarkable progress has been made in the design and construction of modern recovery furnaces and the boilers which they heat. It is apparent, however, that even with the improved efficiencies of the most modern unit the greatest single source of chemical loss is from the furnace and through the stack to the air.

Various analyses have been made for the purpose of determining the proportion of loss to be charged to the several steps in the process through which the cooking chemicals must pass to complete this cycle. One report in a Swedish journal published in 1929 gives figures in per cent of the weight of pulp. These figures, translated in terms of pounds of salt cake per ton of pulp, are as follows:

**Abridgement of original paper presented before a meeting of the Southern Division of the American Pulp and Paper Mill Superintendents Association, October 27 and 28, 1939, New Orleans, La.*

	Pounds Na_2SO_4 lost
Pulp Washing	63.0
Lime Washing	64.4
Furnace	80.0
Handling	5.0
Total	212.4

American practice will give figures somewhat similar, using the so-called Swedish system of recovery (rotary and disc evaporations). The figures are about as follows for one plant.

	Pounds Na_2SO_4 lost
Pulp Washing	88
Caustic Room	15
Leakage	20
Blowing	12
Furnace	65
Total	200

The spray type furnace, such as the Tomlinson and others, when used as a complete recovery unit, do not show as high efficiency in chemical recovery as the older type recovery units, although they are greatly superior in steam production, materials handling and many other respects.

A recent analysis of losses in a mill near the Atlantic Seaboard shows the following figures with a modern furnace unit:

Washing	75 pounds
Caustic Room	15 pounds
Leakage	12 pounds
Blowing	12 pounds
Furnace	201 pounds
Total	315 pounds

While these figures are undoubtedly correct for this plant, they are not intended to be interpreted as the best possible conditions to be obtained with the spray type furnace.

The question which naturally comes to mind concerns the history of the active chemicals in the two systems and reasons, if any exist, that would account for the difference in losses which can be ascribed to the furnace.

Loss of sulphur in the recovery process is greater than the loss of alkali. If it were not so, the sulphidity of the white liquor would increase rapidly unless alkali was added in some other form to maintain the desired condition. No such sulphidity increase is generally experienced and there is often a battle to maintain a definite predetermined sulphidity.

The older type recovery system, including rotary and disc evaporator, has certain definite advantages. Material carried over from the furnace is trapped and returned to the furnace. Sulphur dioxide is also absorbed in such a system from the contact of the flue gases with the drying and evaporating black liquor. These conditions account in large measure for the better chemical efficiency which these old units show.

No recovery system can be operated to best advantage if it does not include a scrubbing system following the furnace. No furnace or method of operating will permit good recovery of values now present in the stack gases.

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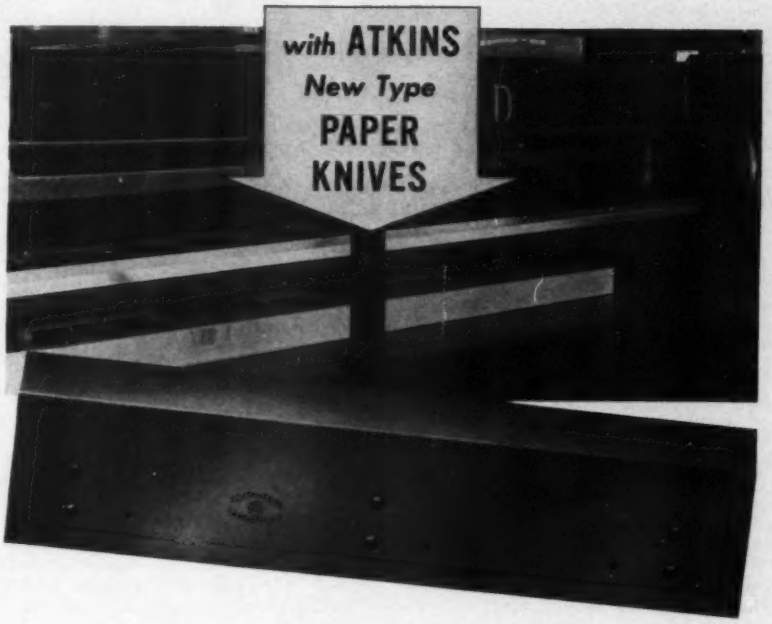

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These values are in three distinct forms: (1) Solids carried out mechanically; (2) Solids in the form of fume; (3) Sulphur dioxide resulting from the oxidation of hydrogen sulphide.

The solids carried out mechanically in most spray-type furnaces represent an important proportion of the loss.

Solids in the form of fume are only partly recoverable by a scrubbing system. However, actual fume losses appear to be relatively small.

The recovery of sulphur dioxide from stack gases is more important than is generally recognized. With high sulphur recovery from stack gases returned as sulphates in the black liquor, the quantity of salt cake required is lowered and alkali in the form of soda ash may be used for chemical make-up. The latter may be added to the green liquor and furnace losses avoided. Generally speaking, one pound of soda ash added to the green liquor is equivalent in sodium oxide value to two pounds of salt cake added to the furnace.

Sulphur dioxide is a gas and after formation in the furnace from the oxidation of hydrogen sulphide, part of it combines with alkali to form sodium sulphite. This compound may usually be detected in the solid salts found in the economizer, superheater and boiler tubes. A part of it is carried out the stack either as free sulphur dioxide or as sodium sulphite. Soluble in any alkaline solution, it may be scrubbed from the stack gases with water or dilute black liquor and to a considerable degree may be removed and returned to the furnace by concentrated black liquor. Efficient removal from the stack gases makes it possible to treat the stack gases economically for odor control.

In some localities the question of odor control is already important; in others it is likely to become so. It is most interesting to realize that chemical economy and odor control are interdependent.

Synthetic salt cake is expected to play an important part in the kraft pulp industry in the South. It is a manufactured product based upon a standard alkali and sulphur sintered together in proportions to make the chemical equivalent of salt cake in sodium oxide and sulphur content. The composition and method of production make it a particularly reactive material readily reduced to sodium sulphide.

Upon heating in the presence of a limited amount of air, reaction occurs with the components forming various sulphates and sodium sulphide directly. Since this reaction is exothermic, the total heat required to form sodium sulphite is measureably less than is the case with sodium sulphate.

Synthetic salt cake is best introduced into the recovery furnace in the dry form and not in the black liquor. If introduced in the black liquor reaction with the organic components results in low sulphide content in the smelt with correspondingly high stack losses. Introduced separately in the reducing zone of the furnace preliminary formation of sulphide, sulphites and sulphate occurs and these compounds are then reduced in contact with the black ash.

Substantially, the reaction may be considered as:

$$Na_2CO_3 + S + 2C \rightarrow Na_2S + 3CO$$

Certain other possibilities of this versatile synthetic salt cake are not yet completely explored. It is possible to generate hydrogen sulphide directly from the new product and it may be possible to carry out the reaction absorbing the hydrogen sulphide directly in the white liquor without using the high temperature of the furnace for this reduction.

◆

▶▶▶ IT IS EXPECTED that during the period of hostilities in Europe, the German trade in machinery with Cuba will drop considerably as will British sales. It is understood that several orders that ordinarily would go to foreign organizations, have been placed with American firms.

▶▶▶ HAND-MADE PAPERMAKING IN INDIA is now a dying industry and has disappeared completely from many places in that country, according to a report from the Forest Products Division of the U. S. Department of Commerce. In Bengal, this industry was in the hands of a class of people known as Kagzis and even 30 years ago a large number of people were engaged in hand papermaking but most of them could not compete with the machine-made paper.

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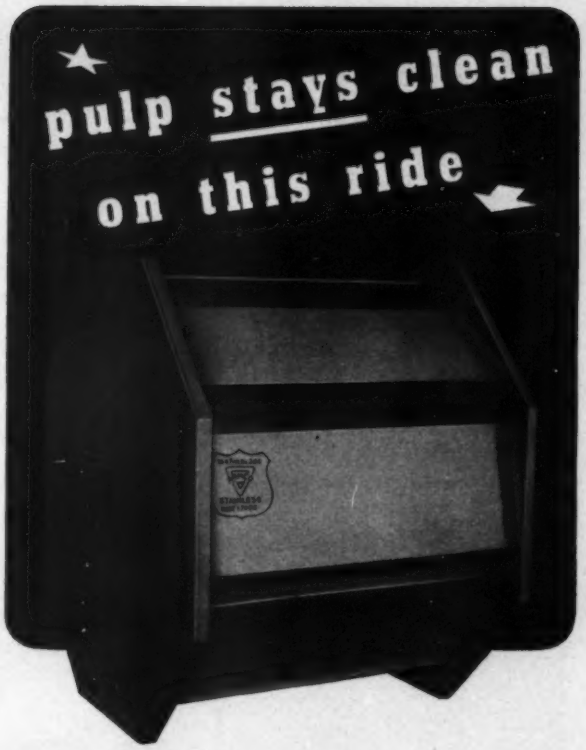

• Want to collect "full fare" from the pulp riding in your continuous rotary beaters?

One sure way to realize every pound is to use equipment made of ARMCO Stainless Steel. Then you can depend on *clean* pulp to come out *clean.* This way there is no waste—no danger of costly rejects caused by contaminated pulp.

Pictured here is the unadorned "inner works" of a rotary beater. It is spot-welded, with formed flanges and division walls. Given ordinary care, the hard smooth surface of this bright metal won't rust. Neither will slime and verdigris accumulate. It is easy to clean and keep clean. Moreover, equipment made of ARMCO Stainless Steel lasts longer and costs less to maintain.

Why not see for yourself how ARMCO Stainless Steels withstand the conditions set up by pulp and paper chemicals? See how it helps you make top-quality papers at lowest possible cost. Write us about your problems and we shall be glad to assist in their solution. The American Rolling Mill Co., 2041 Curtis Street, Middletown, Ohio.

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PERSONALS

DR. TALBOT MADE HEAD OF G. P. I. RESEARCH DEPT.

Dr. William F. Talbot, who joined the staff of Arthur D. Little, Inc., chemists and engineers of Cambridge, Massachusetts, in June, for the purpose of carrying out studies for the General Printing Ink Corporation, has recently been made research director of the lat-

Dr. Wm. F. Talbot

ter company. Arthur D. Little, Inc., will continue to act in an advisory capacity and to carry on special researches.

Dr. Talbot, who received his Ph. D. from the State University of Iowa in 1929, will be in charge of research and development work for the General Printing Ink Corporation and of their laboratories in New York City.

◆

WHITTEMORE LEAVES CERTAIN-TEED PRODS.

After twenty-nine years of association with the Certain-teed Products Corporation, Audenried Whittemore, executive vice president, has resigned his position and has severed all connections with the company, including the presidency of its subsidiaries, the Beaver Company, Ltd., and the Beaver Wood Fibre Company, Ltd., both of Ontario.

Mr. Whittemore joined the General Roofing Manufacturing Company, predecessor of Certain-teed, in 1910 as mechanical engineer. He became district sales manager in Chicago in 1914 and in 1917, when Certain-teed was organized, he was made vice president in charge of sales. He was named executive vice president in 1938.

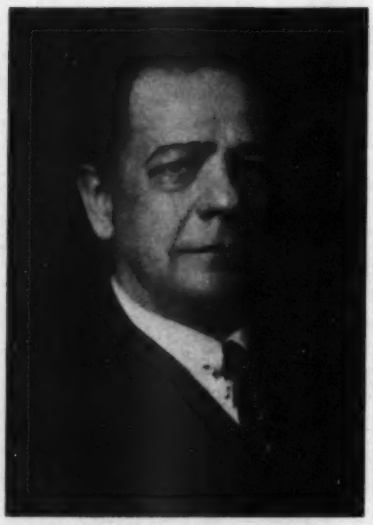
◆

▶▶▶ *Herman L. Joachim,* formerly mill manager of the Container Corporation of America's plant at Manayunk, Pennsylvania, has established offices as consulting engineer in the Chamber of Commerce Building, Los Angeles, California. Mr. Joachim, who is well known throughout the paper industry, has been recently associated with the bagasse pulp development in Hawaii where he was instrumental in building and operating a pulp mill.

◆

DR. OTTO KRESS IS AWARDED TAPPI MEDAL

The executive committee of the Technical Association of the Pulp and Paper Industry has announced that the TAPPI medal for the year has been awarded to Dr. Otto Kress, technical director of the Institute of Paper



Dr. Otto Kress

Chemistry. Dr. Kress is widely known as the author of a large number of technical publications, and he has long been an outstanding figure in educational circles.

The medal is awarded each year at the annual meeting of the Technical Association, and the presentation to Dr. Kress will be made officially at the Twenty-fifth annual meeting in New York, February 19 to 22, 1940.

◆

▶▶▶ *Hon. Charles A. Dunning,* has been elected to the board of the Consolidated Paper Corporation. He resumes the directorship he relinquished upon becoming Minister of Finance several years ago.

◆

▶▶▶ *Maynard D. Church,* now president of the Moore Steam Turbine Corporation, subsidiary of the Worthington Pump and Machinery Corporation,

Maynard D. Church

has been elected vice president of the latter concern, it was announced recently. Mr. Church, a graduate of Syracuse University, has been associated with the Moore organization since 1924.

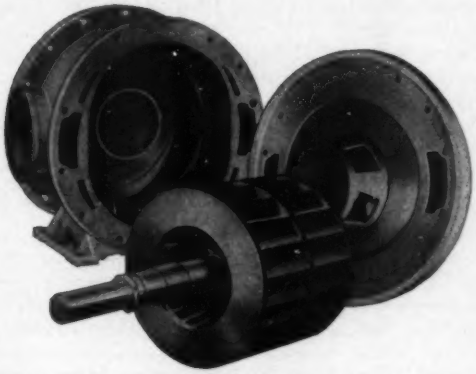
◆

DR. MACK JOINS BATTELLE STAFF

Now a member of the supervisory staff of Battelle Memorial Institute, Columbus, Ohio, is Edward Mack, Jr., formerly head of the Department of Chemistry at the University of North Carolina. Dr. Mack will act as technical advisor in physical chemistry to the sponsored industrial projects and in addition will correlate the Institute's fundamental research work.

Dr. Mack's accomplishments in physical chemistry have received wide recognition. He has made many notable contributions in the fields of molecular structure, diffusion, X-ray crystallography and physico-chemical processes. In addition to his teaching

SIMPLICITY



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Operating advantages made possible by the Nash principle, and present in no other type of vacuum pump, permit a new level of operating economy. Nash Vacuum Pumps have but one moving part, a rotor cast in one piece, and revolving without metallic contact. There are no valves, no pistons or sliding vanes, no internal parts requiring wear adjustment or lubrication.

NASH ENGINEERING COMPANY
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NO NOISE
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NO MAINTENANCE IN A YEAR OR MORE OF OPERATION

This new Murray Flat Screen is one of a number in continuous operation for over a year in a leading paper mill without even a wrench being applied. Its capacity is greater, stock cleaner, power less than other types of equipment, aside from its minimum maintenance. This screen has a special drive developed to meet exacting and heavy-duty requirements at high speed—modern equipment for the mill that must improve quality and cut operation costs to meet competition. Repeat orders from users of the New Murray Flat Screens testify to satisfactory performance. Write for complete details.

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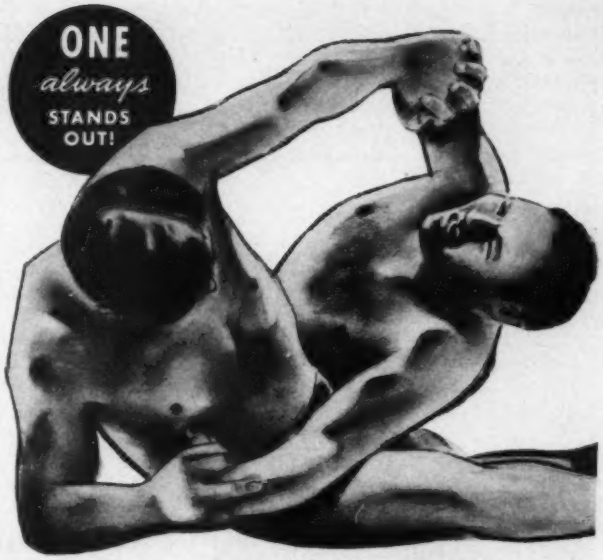

Gripping Power...

Like the top-notch wrestler, GARLOCK 725 Rubber Transmission Belting has *exceptional gripping power*, coupled with *strength* and *endurance*. Constructed of high-grade duck, frictioned with Garlock special rubber compound, folded to size and cured under tremendous pressure, this flexible belting *holds fast*, and wears remarkably long. All standard belt sizes from 1-in. x 2-ply to 28-in. x 12-ply. Try it on your toughest job!

THE GARLOCK PACKING CO.
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GARLOCK 725

experience, Dr. Mack has had extensive and varied experience as an industrial consultant, having been a member of the National Research Council from 1928 to 1933 and of the Westinghouse Advisory Board in 1930 and 1931.

◆

C. B. NYMAN CONNECTED WITH SWENSON

Now a member of the organization of the Swenson Evaporator Company, Harvey, Illinois, is C. B. Nyman, who has had lifetime experience with paper mill and filtration problems. Mr. Nyman, who is well known throughout the paper industry, will specialize on the design of equipment for multi-stage single-drum kraft washing and related problems.

C. B. Nyman

The Swenson Evaporator Company is expanding its line of filter equipment to include all requirements of the paper industry, as well as equipment for use in mines and other industrial applications.

◆

PERKIN MEDAL AWARDED DR. STINE

In recognition of his valuable work in applied chemistry, Dr. Charles M. A. Stine, vice president in charge of research at the E. I. du Pont de Nemours and Company, has been elected to receive the Perkin Medal of the Society of Chemical Industry for 1940. The medal, an annual award, will be presented to Dr. Stine on January 12 at a meeting to be held at the Chemists' Club in New York City.

Dr. Stine, a graduate of Gettysburg College and John Hopkins University, became associated with the du Pont organization in 1907. He was in charge of organic chemical research from 1909 to 1916, later becoming assistant director of the chemical department and still later becoming vice president in charge of research, a member of the executive committee and a member of the board of directors. He is, at present, serving in all three of these capacities.

◆

▸▸▸ *Ralph M. Hoffman,* vice president and sales manager of the Link-Belt Company's Pacific Division for the last eight years, has been appointed assistant to the president of the parent organization with headquarters at the company's general offices in Chicago.

◆

PROMOTIONS AT G-E FOR MESSRS. WILSON & REED

Charles E. Wilson, executive vice president, was elected president and Philip D. Reed, assistant to the president, was elected chairman of the board of directors of the General Electric Company at the meeting of the directors of the company on November 17. They will take over their new responsibilities January 1, succeeding Gerard Swope and Owen D. Young, who will become honorary president and honorary chairman of the board, respectively.

Mr. Wilson, who began his career in business as an office boy at the age of 13, has been executive vice president of G-E since December, 1937. Mr. Reed joined General Electric in 1926 as assistant to vice president C. W. Appleton of the company's law department.

◆

▸▸▸ *Raymond Kelly* has resigned as vice president in charge of sales of Bathurst Power and Paper Company, Ltd., and will establish his own organization in New York. He will, among other lines, represent Bathurst in the sale of newsprint in the United States.

◆

▸▸▸ Formerly assistant manager of the Toronto office of E. B. Eddy Company, Ltd., *George Earnshaw* has been transferred to the head office of the company at Hull, Quebec, as manager of the fine and coarse paper division. He has been with the company since 1924.

◆

▸▸▸ Now a member of the National Research Council of Canada is *Dr. Otto Maass,* professor of physical chemistry and head of the department of chemistry at McGill University. Dr. Maass, an honorary life member of the Technical Section of the Canadian Pulp and Paper Association will serve on the Council for three years.

◆

PEPPER ELECTED TREASURER OF SCOTT PAPER CO.

G. Willing Pepper, now a partner in the investment banking firm of Smith, Barney and Company, will become treasurer of the Scott Paper Company, Chester, Pennsylvania, on or about January 1, it was revealed recently. Mr. Pepper plans to resign as partner of the organization with which he is connected at present in order to accept the office of treasurer and membership on the Scott Paper Company's board of directors.

The paper company has announced the election of William F. Mohan as first vice president; Raymond C. Mateer, formerly vice president in charge of purchases, as vice president, and William S. Campbell, formerly secretary of the company, as vice president. William R. Scott III, head of the concern's legal department, was elected to fill the office of secretary.

NECROLOGY

R. S. MacPHERRAN

Ralph Stewart MacPherran, 67-year-old chief chemist for the Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, passed away November 13 in Duluth, Minnesota, while visiting.

Mr. MacPherran was born at Sterling, Illinois, and after getting his degree from the University of Michigan, served three years as chemist for the Illinois Steel Company at Joliet, Illinois. He was well known by reason of his outstanding work in the improvement of gray iron castings and in 1931 received the H. J. Whiting gold medal of the American Foundrymen's Association for this latter research. Mr. MacPherran had just retired from Allis-Chalmers after almost fifty years of service with that firm.

◆

▸▸▸ *John Welsh,* formerly associated with Northern Paper Mills and Hoberg Paper and Fibre Company, both at Green Bay, Wisconsin, passed away November 25 at the age of 70 in St. Paul, Minnesota. Mr. Welsh had operated a converting plant in St. Paul for several years. He is survived by his widow and one son.

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THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL

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Good knives mean faster and better cutting,—longer service between grinds.

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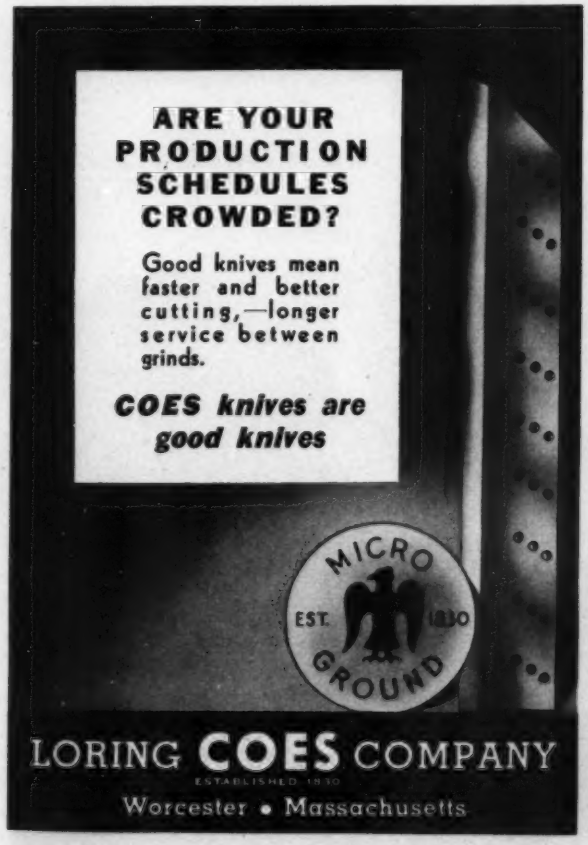

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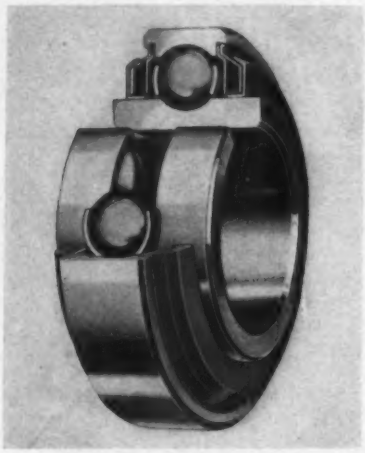
NEW EQUIPMENT AND SUPPLIES

New Seal Design for Ball Bearings

A new seal design for ball bearings, designated as the *Mechani-Seal,* has been announced by The Fafnir Bearing Company, New Britain, Conn. The Mechani-Seal design is an integral part of the bearing itself. Two steel plate shields, widely separated to form a trap, serve as



the innermost members, both attached to the outer bearing ring. Another steel plate, pressed on the bearing inner ring, acts as a slinger when this inner ring is rotating. Definite though extremely close clearances exist between the individual members so that nothing is added to the total bearing friction. The outer members, in addition, are given a corrosion and rust proof treatment.

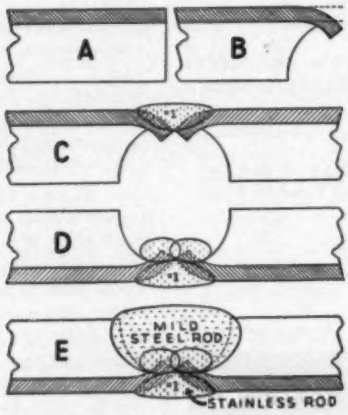
Meter Line Restyled

Bailey Meter Company, Cleveland, has restyled its complete line of meters for power plants and industrial processes. In this restyling, sturdy construction features and other advantages used in the former

meter casings were adopted for the new meters. Several mechanical improvements also were made. Durability has been increased by a steel ring welded to the meter casing, it also serving as a support for a new piano type hinged door. The door, closing upon a synthetic sponge gasket, seals the sensitive meter parts from moisture and dust. A narrow tray at the top of the meter casing prevents dust from falling into the meter when the door is opened.

Stainless-Clad Steel Welding Method

The Composite Steel Division of the Jessop Steel Company, 568 Green Street, Washington, Pa., according to a recent announcement, has perfected a new method of welding stainless-clad steel that eliminates any danger of reduction in corrosion resistance in the weld zone. The procedure is illustrated. Sketch A shows the plate as supplied, the lined portion, as in the case of the succeeding sketches, represent-



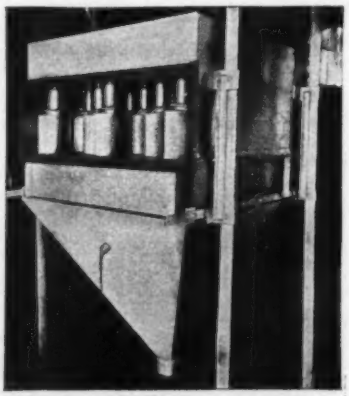
ing the cladding. Sketch B illustrates the plate after scarfing, the cladding being bent down with a follow-up tool or hammer. The primary weld (bead #1, sketch C) is made with a ⅛ in. diameter stainless steel coated rod at the juncture of the two claddings. Then the two plates are turned over and secondary welds made on the underside of exposed claddings (sketch D), using a 3/16 in. diameter stainless steel coated rod. The final weld (joining the mild steel backing) may be made with a ¼ in. diameter mild steel coated rod. Sketch E represents the completed weld; bead #1 then being ground flat with the cladding.

In all cases where stainless rods are used, the rod should be richer in alloy than the cladding; and lowest possible amperage and fastest possible welding time are recommended.

Tubular Dust Collector

Prat-Daniel-Corporation, Port Chester, N. Y., has announced the development of a tubular collector for pulverized fuel dust application where space requirements are limited. The collector may be installed vertically, or horizontally, or at an angle, or it may occupy the space at the bottom inlet to an air preheater. The entire collector is surrounded by its inlet duct and dust hopper. The centrifugal apparatus of the collector is a series of steel tubes, each equipped with two slots in its upper half. Each slot has a directional vane on the exterior of the tube. The lower half of the tube extends into the dust hopper through a tube sheet.

The gas enters the inlet plenum chamber, and passes through the slots in the tubes, rotating around a smaller central tube. The central tube extends to a point somewhat below the bottom of the slots in the outer



tube, and upward to a tube sheet which forms the bottom of the outlet duct.

The dust is precipitated against the sides of the outer tube, and is carried down the walls of the tube into the hopper. The cleaned gas is evacuated through the smaller central tube to the outlet duct.

The apparatus is constructed in sections, each with an assembly of tubes. These sections are completely assembled before shipment, and are of a size and weight convenient for handling in the field.

Wire Rope Car Puller

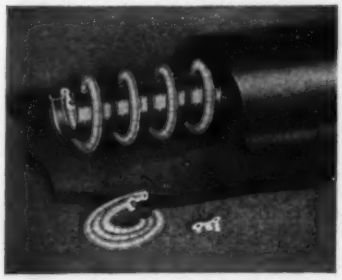
Stephens-Adamson Manufacturing Company, Aurora, Ill., has announced a wire rope car puller with horizontal capstan. The

puller, designated as No. 14, has a capacity up to 6 fully loaded cars. It is designed with heavy duty clutch and flanged drum to operate with wire rope, the drum accommodating 500 ft. of ⅝ in. wire rope.

Electric Heating Element

The Patterson Foundry & Machine Company, East Liverpool, Ohio, has announced a new electric heating element known as the Patterson *Flasheat* element. This element is

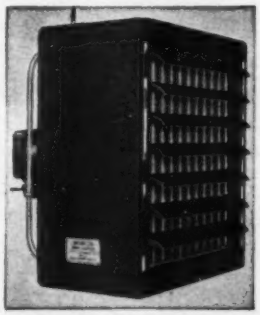
standard equipment on all Patterson electrically-heated kettles, and also is available for use in heating various types of vessels, chemical apparatus, etc. Among the claims made for the element by the manufacturer are: more rapid heat-up; more heat concentration



per unit area when desired; rapid water cooling; higher efficiency; unusual ruggedness; immediate replacement without removal of insulating jacket from kettle or other receptacle on which the element is used; and no necessity for preforming to fit shape of kettle or other body to be heated.

Unit Heater

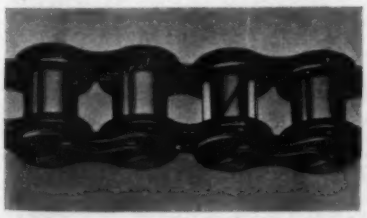
D. J. Murray Mfg. Co., Wausau, Wis., has announced a unit heater, designating it as *Murco*, for space heating with steam or hot water. The heater is made in



sixteen sizes. Its case is crackle finish, trimmed with chromium strips in front. Heavy wall copper tubes are used for the heating elements. The condenser is "full floating." Motor is totally enclosed.

Channel-Lubricated Roller Chain

A channel-lubricated roller chain, interchangeable with all other standard roller chains, has been announced by the Morse



Chain Company, Ithaca, N. Y. The channels act not only as reservoirs, but as paths for the flow of oil through the side plates and down to the pins, where the lubricant is seized and spread by capillary action in a protective film over the entire contact surfaces of pins and bushings. Single, double, triple, and quadruple widths, all standard pitches, and standard stock attachments are available in the improved chain.

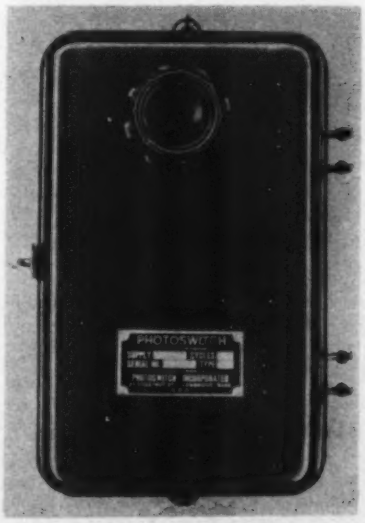
U-Bolt Gate Valve

A U-bolt gate valve, which permits replacement of the U-bolt with standard stock bolts, has been introduced by The Ohio Injector Company, Wadsworth, Ohio.

The valve has a self-seating type, horseshoe-shaped, slip-on wedge of standard taper. The wedge comes in malleable iron on the iron valve, and in high grade steam bronze on the bronze-mounted valve.

Photo-Electric Control Apparatus

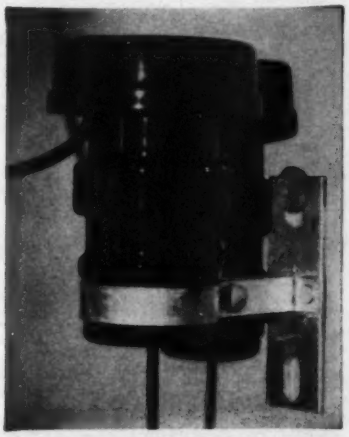
Photoswitch Incorporated, 21 Chestnut Street, Cambridge, Mass., has announced a line of photo-electric control apparatus for such applications as smoke control, counting, speed compensation, edge control,



paper break detection, and for use in connection with densometers in the testing of paper. The manufacturer further states that each control is furnished in a dust-proof, waterproof housing; that each control contains no sensitive parts; and that each control is readily installed in any location.

Lightning Arrester

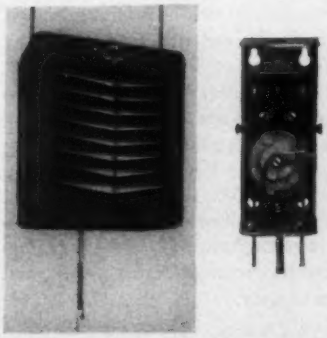
An improved form for the LV lightning arrester device for protecting power distribution systems from lightning has been announced by Westinghouse Electric & Manufacturing Company, East Pittsburgh. Four important improvements are built into the arrester. A change in the blocks or valves gives increase in surge-current capacity. An entirely new insulating coating for the sides of the blocks reduces external flashover. A special terminal plate improves uniformity of performance. Several improvements in the quench and



porcelain gaps increase the range of power-follow currents that will be interrupted. They also decrease the likelihood that an arrester failure following a lightning discharge will leave the line short-circuited. The new arrester is available for distribution circuits with maximum line to ground voltages of 3,000; 6,000; or 9,000.

Unit Heater Automatic Control

Grinnell Company, Inc., Providence, R. I., has announced that a built-in automatic control is provided in its automatic *"Thermolier"* unit heaters for the control of both day and night temperatures. The control



also may be added to unit heaters of any make. Day and night settings, once the two pointers of the instrument are adjusted, are made by a pull-cord control hanging from the heater. A special setting permits summer operation of the fan alone, under automatic thermostat control, without additional wiring or other changes.

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Lockseam Spiralweld
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FROM LINE JITTERS

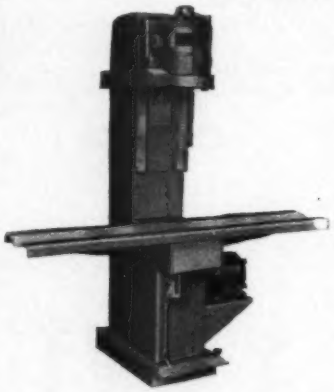
There's only one light-weight pipe to use if you want to forget vibration worries. Naylor Pipe alone gives you a continuous expansion joint built into the pipe. This exclusive Lockseam Spiralweld feature effectively cushions shock loads, stresses and strains, and cuts maintenance costs to new lows. Naylor Pipe is easy to handle—simple to install, too. Sizes 4" to 30" in diameter with all type fittings and connections. Our complete fabrication service can save you money.

WRITE FOR CATALOG NO. 37

NAYLOR
PIPE COMPANY
1236 EAST 92nd STREET
CHICAGO, ILLINOIS

Knot Drill

A knot drill which eliminates pipe line connections of any kind has been announced by D. J. Murray Manufacturing Company, Wausau, Wisconsin. The machine, according to the manufacturer, is faster because it is not dependent on outside connections; it is self-contained; it operates on proven principles of oil drives found on modern precision tools; it is adjustable; it is positive; and it is rugged in design.



Visible-Flow Pipe Fitting

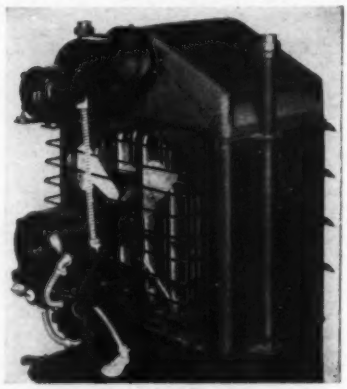
Cochrane Corporation, 17th Street & Allegheny Avenue, Philadelphia, has developed a pipe fitting with sight glass arrangement for use in piping installations where visual inspection of fluid flow is desired. The fitting, flanged for installation in the line, measures 13¼ in. between finished surfaces. The body of the fitting is of cast iron. Window frames are of steel; and windows are of Pyrex glass. The fitting is designed for 2½, 3, 4, 5, 6, and 8 in. lines.

Rate of Flow Indicator

A rate of flow indicator, designated as the MJL flow indicator, has been announced by Morey & Jones, Ltd., Room 400, 922 South Hemlock Street, Los Angeles, Calif. This instrument is actuated by the differential pressure produced by a primary device, such as an orifice, venturi tube, or pilot tube, inserted in the pipe line. The differential pressure is balanced by a calibrated bellows unit which moves in direct relation to the pressure applied. This movement is transmitted to a pointer, the scale for which may be furnished to read directly in any units of flow desired. The instrument may be calibrated for any differential pressure range between 0-30 in. and 0-225 in. of water. To change the range of the instrument in the field, it is only necessary to insert a new calibrated bellows unit.

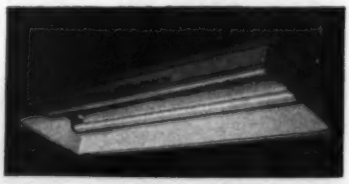
Gas-Fired Unit Heater

The Automatic Gas-Steam Radiator Company, 556 Brushton Avenue, Pittsburgh, Pa., has announced a gas-fired unit heater that is equipped with an automatic flue for venting products of combustion from interior of building. The gas, natural or manufactured, fires into a combustion chamber, the products of combustion passing upward into a bank of tubes and then automatically carried outside. Air is passed around these tubes by means of a motor-driven fan located on the back of the unit. A safety pilot turns off the gas as the pilot goes out or burns low to insure ignition. The heater is made in sizes ranging in capacities from 85,000 to 200,000 b.t.u. per hour.



Twin Lamp Fluorescent Fixture

Benjamin Electric Manufacturing Company, Des Plaines, Ill., has announced a porcelain enamel fixture for housing two 48 in., 40 watt fluorescent lamps. When used for general lighting, this fixture, designated as the Benjamin *Stream-Liter*, should be installed not to exceed the familiar 1½ to 1 ratio of spacing distance to mounting height. Lamps, sockets, thermal glow-switch starters and line ballast equipment for regulating current to the lamps are all attached to the reflector which is hinged to the upper housing of the fixture for greater accessibility. Suspension of the fixture is by means of chandelier chains to hooks provided on top of housing or by rigid conduit secured through knock-outs in housing by lock-nuts.



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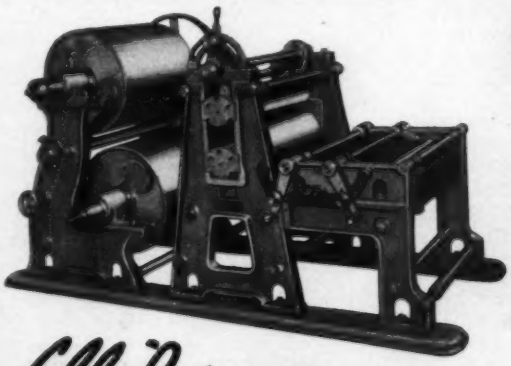

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TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

The So-Called "Defective" Celluloses

The average degree of polymerization (d.p.) of many of the nitrates of technically prepared cellulose is actually much higher than that of the original cellulose. Sometimes the nitrate may have a d.p. of over 700, whereas the original cellulose had a d.p. of 185. The authors seek to explain this paradox. They find that if the same celluloses are purified by solution in and precipitation from Schweizer's reagent, they yield nitrates of the same d.p. as the purified material. The assumption is that the usual chains of glucopyranose residues, which are uninterrupted in normal cellulose molecules, are modified in these technical products, by oxidation, so that they can form ester-like unions (defective spots) with other chains. These esters are then ruptured in the alkaline Schweizer's reagent, or in alkali, but not in the nitrating bath. Such ester unions may be formed in different ways; e.g. on treatment with oxidizing agents (like those present in ordinary bleach solutions) acting on normal cellulose. Oxidation changes the glucose residues in certain cases to carboxylic acids, which then form esters, which are hydrolyzed by alkali. Cellulose into which such foreign groups have been introduced are termed "defective" (fehlerhaft). Those which contain ester unions are termed "ester celluloses". The ester number of a nitrate is defined as:—

$$\frac{\text{d.p. nitrate in acetone}}{\text{d.p. cellulose in Schweizers reagent}} \quad \text{—1.}$$

When this number is greater than one, it indicates that at least one ester group is present in the cellulose macromolecule. If it is less than one, a mixture of normal and defective celluloses are present. (Presumably the assumption is that when it is zero, there are no ester celluloses present—*Abstractor*). It is especially with acid oxidants that defective celluloses are obtained. Alkaline oxidizing agents cause ready cleavage of the ester unions. Ester celluloses with a certain d.p. often have about the same tensile strength as do hydrocelluloses of the same d.p. (obtained from normal cellulose). Hence deductions regarding the strength of a cellulose fiber from its d.p. (viscosity in Schweizer solution) may be impossible, if the fiber is an ester cellulose (i.e. defective), and not a normal cellulose. The strength of such materials may be gauged as follows:—the cellulose is nitrated and the d.p. of the ester celluloses (total average length of the cellulose chain molecules) is measured by viscosity of the nitrate solutions. The viscosity determination in Schweizer reagent then gives the d.p. of normal cellulose chains (i.e. those stable to alkali). A differentiation between ester and normal celluloses has an industrial significance (especially in textiles). For example: ester cellulose of a high ester number are greatly injured by soap solutions. The authors point out that other researches are required to show whether injury to normal cellulose chains are produced by dyes or overheating. H. Staudinger and A. W. Sohn. Ber. 72B. 1709-17 (1939); Naturwissenschaften 27, 548-9 (1939); C. A. 33, 9291 and 9625 (1939).

Sulphite Digestion of Manchurian Woods

The woods listed in the data below were subjected to sulphite cooks. Another wood, Maakia amurensis Rupr. et Max, even when cooked for 12 hours, under similar conditions was not digested.

From the fairly high pentosan content, percentage ash, and extractives, the bleached sulphite pulps, whose properties are listed in the table, are definitely inferior to rayon pulps now on the market. I. Miura and T. Nakatsuka. Cellulose Ind. (Tokyo) 1939, 218-20 (English translation 50-52).

Species	Yield	Ash	Alcohol-benzene extract	*a*-Cellulose	Pentosan	Copper number	Viscosity	Amount of alkali absorbed by pulps
	%	%	%	%	%			
Ulmus macrocarpa	25.7	0.84	1.20	87.06	8.52	1.56	1.41	12.57
Ulmus laciniata	33.4	0.62	1.33	81.43	7.78	3.44	1.39	10.04
Ulmus japonica	22.5	0.61	1.83	85.60	7.76	2.95	1.51	8.47
Fraxinus mansburica	43.9	0.52	0.72	91.53	5.83	2.06	1.53	9.32
Quercus mongolica	25.1	0.49	1.27	89.10	8.62	2.39	1.59	5.83
Acer mono	35.1	0.45	0.84	87.21	6.71	2.77	1.54	16.35
Acer triflorum	33.5	0.57	1.39	88.17	8.16	2.35	1.48	2.83
Juglans mansburica	38.4	0.68	1.28	86.45	7.64	1.72	1.88	10.64
Phellodendron amurense	30.8	0.58	0.83	89.42	5.82	1.98	2.20	9.41

The Binding of Ions by Sulphite Pulp

This is the abstract of a complete Ph.D. thesis from the Royal Technical College at Stockholm. Parts of it have previously been published in appropriate Swedish and German journals. Included therein are an introductory review on the occurrence of ionic-exchange reactions, their explanation in accordance with the classical chemical theory, absorption theory, the acidoid theory, etc.; the Donnan equilibrium in ionic exchange, and the various mathematical formulations involved and the analytical techniques employed (pH measurements, acidometric titration, potentiometric titrations, etc.). It is evident that a more exact knowledge of the activation factors, and other properties of individual ions in their relationship to varying conditions is essential. Ions of high valence but with an "open structure" (i. e., in which the points at which charges are lodged in the molecule are widely separated from each other) exert no greater influence on the activation factors than do corresponding monovalent ions of the same normality. Through this finding, it becomes easier to study the inner activity of those substances to which ions are bound. This property of fixing ions was determined especially in a number of samples of strong sulphite pulp. The penetrability of anions was followed by studying the action of various salts, containing varying valence types, and used in varying concentrations. From these studies it appears that lignosulphonic acid within the pulp corresponds to about 0.2-0.4 normal. The boundaries between the fiber and the solution, however, are not sharp, and there seems to be an "ionic cloud" which serves as a zonal layer between the inner high concentration and the low concentration of the outer solutions. While the binding power of the strong sulphite pulp appears to depend largely on the presence of the strong lignosulphonic acid, there is probably also present a weaker (hydroxycarboxylic acid possibly formed by the oxidation of the polysaccharides) the binding power of which manifests itself as the pH increases to 6. Finally at pH 8-10, another acid group, probably phenolic, is brought into focus. The relative amounts of these acidic components in various pulps, cooked to varying degrees of freeness, have been determined and fully tabulated. The exchange constants between a large number of different ions were also determined, and these were correlated with the individual ionic activities, thus giving

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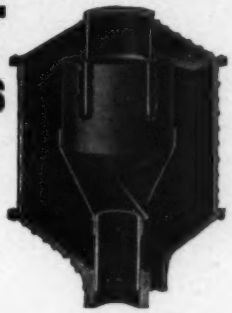

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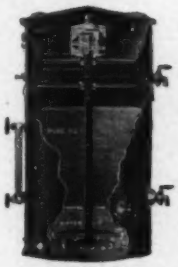

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a new measure for ionic activity factors, which confirmed those that had been found previously. The irregularity in ionic distribution in the suspension of substances that bind such ions, caused the author to re-examine the meaning of the pH in suspension, and the true pH in the inner portions of the solid particles. Practical conclusions were drawn from the unequal ionic distribution, and pH differences on the rate of dissolving out salts, on decomposition of such salts, etc. The effect of the accumulation of certain ions, and the diminution of others is discussed (e. g., on the rate of bleaching). The discussion also includes the various swelling and dispersion forces, as well as the entire question of the rate of delignification during the sulphite cook. The author also treats the influence of ash content and the changes in such content, on the nature of the pulp, and the effect of loading with certain ions on the stability of the pulp during drying and on pulp discoloration. Finally the binding of ions by other technical materials is briefly outlined: e. g., the question of the most effective ionic concentration in the use of zeoliths, the acidoid properties of starch, the rate of solution of glue from bones, etc. The author gives 31 illustrations, 82 recent literature references, and 19 very complete tables. For details the original should be consulted. Carl du Rietz. Thesis, pp. 124 (1938).

Lignin of Wood Pulp Compared With Willstatter Lignin[1]

The bromination of wood pulp lignin in CCl_4 yielded a product which contained 0.9 to 1.5 atoms of bromine for every methoxyl group. Willstätter lignin (isolated with fuming HCl) under similar conditions gave a product having 1.1-1.4 atoms of bromine for every methoxyl. Humic substances formed by the action of "supersaturated HCl" on cellulose and glucose, when brominated, gave products very similar to the brominated lignins. During lignin bromination, some MeO groups are split off. Acetylation of wood pulp lignin gave about 38% acetyl, Willstätter lignin about 24%, and the humic substances referred to above about 11-12%. The derivatives obtained from Willstätter lignin are most stable while those from the humic acid derivatives are the least stable. Color reactions, according to the author, like the phloroglucinol test are due to the lignin itself—not the impurities.[2] P. N. Odintsov. J. Applied Chem. (U.S.S.R.) 12, 901-7 (1939) through C. A. 33, 9290 (1939).

Abstractor's Note—[1]It is not quite clear just what the term "Wood pulp lignin" means; whether the lignin is obtained from waste liquors in (soda) pulp or isolated from mechanical pulp.
[2]An extremely doubtful statement.

Protecting Moist Groundwood with Lignasan

The protection of mechanical pulp against fungal attack by "lignasan" proved promising. The addition of 200-500 g. lignasan per ton (50 per cent dry) pulp served to protect the stock for an 8 months period. Untreated pulp stored during the same period, and kept under similar conditions showed marked fungal attack. Even smaller amounts (125-150 g. lignasan/ton moist pulp) proved effective in inhibiting attack. The author investigated the most advantageous point in the process at which to add the fungicide. Addition on the riding roll of the wet machine served to give better results than addition on the wire or in the first press. The direct addition to the backwater system remains to be thoroughly investigated. E. Rennerfelt, Svensk. Pappersmasse-Tidn. 16, 51-2 (1939), through Papier-Fabr. 37, 74 (1939).

Bagasse Pulping

By treating bagasse with 5% NaOH at 145 deg. for about 1 hour, pulp of good quality was obtained in 42% yield. This contained 88.1% alpha-cellulose, 0.19% ash, 0.17% lignin, and 16.6% pentosans. Its copper number was 0.68. The length and the width of fibers were respectively 0.83-0.9 mm. and 21.3-22.3 mu. H. Kurazawa. J. Soc. Trop. Agr. Taihoku Imp. Univ. 10, 215-24 (1938) through C. A. 33, 8010 (1939).

Physical Testing of Barium Sulphate and Titanium Oxide

This is a differentiation of these pigments which are just mechanically mixed, and those which represent composite pigments by precipitating the titanium oxide on the barium sulphate. Chemical analyses are of no use in this connection. However certain dyes, like methyl violet, stain the titanium oxide grains in mixed but not in the composite pigments. Also fractional sedimentation can be used. The composite pigments appear homogeneous, exhibiting almost identical properties, irrespective of attempted fractionation. The fractions of the mixed pigments have very different properties. J. Bancelin and I. Crimail. Chim. et Industrie 42, 20-22 (1939); through Bull Inst. Paper Chem. 10, 22 (1939).

Controlled Delignification of Australian Woods

Eucalyptus (regnans) wood was used in the form of sawdust, radial sections and shavings, and pretreated with aqueous 0.08% NaOH at the boiling point, followed by treatment with chlorine water, and retreatment with 0.08% NaOH. This yielded 66-69% of a residue which contained 85-90% of all furfural yielding components of the wood. When the alkali concentration was increased, there was a marked decrease both in the per cent cellulose and furfural yielding substances. W. E. Cohen and H. E. Dadswell. J. Council Sci. Ind. Research, 12, 115-27 (1939) through C. A. 33, 9630 (1939).

Rapid Cellulose Determinations

These are modifications of Kürschner and Hoffer's method. The methanol is used in the place of ethanol. This reduces the temperature. The reaction is speeded up by increasing the HNO_3 content of the mixture (1 volume of concentrated HNO_3 to 2 volumes methanol). The results indicate that the modification is an improvement. Another method, which uses acetic acid and nitric acid gave good results. The method was simplified by the use of a continuous extractor. A comparison of the original K and H method with these two modifications give gratifying results. All are in fair agreement (with variations of 0.1-0.7%. However the new methods require only one hour, while the original required 3 hours. A. Tettamanzi. Atti. X° cong. intern. chim. 3, 473-8 (1939) through C. A. 33, 9625 (1939).

Naphthenate Soaps as Sizing Materials

The utilization of naphthenic acid soap is based on the formation of aluminum naphthenate (the stablest of the salts), which is soluble in ether, gasolene, and benzol. It hardens by polymerization and becomes a very elastic adhering film. In making millboard, 100 parts of fiber were mixed with an emulsion of 1.5 parts paraffin (of the type used in impregnating matches), 0.75 parts turpentine, 12 parts of alumina (as hydroxide?) and 15 parts naphthenic acid in water at 50 deg. C. The mass is then rolled between rollers. A. I. Gershzon. Kozhevenno-Obuvnaya Prom. 17, No. 7, 44-5 (1938); Ibid 17, No. 10, 41-2 (1938) through C. A. 33, 8989 (1939).

Steam in Sterilization of Baled Pulp

The sterilizing effect of steam on small bales of chemical and mechanical pulp was studied with a view towards determining whether the method was suitable on a commercial scale. Steam consumption was kept at a minimum, the lowest practical temperature being maintained during extended time periods. Despite the fact that the temperatures within the bales were never very high, these inner portions retained the heat for a sufficient time to insure sterilization. At 47 deg. C., Pullularia pullulans mold was killed. The resistant brown rot was destroyed at 61 deg. C. Esko V. Airola. Finnish Paper and Timber J. 21, No. 7A, 132-6 (1939) through Bull. Inst. Paper Chemistry 9, 449 (1939).

Swelling of Starch and Retention of Fillers

So-called "swelling starches" are referred to, as having to do with the improvement of paper quality and economy of manufacture. In the case of a printing paper, it was shown that the 4% addition of a swelling starch to a paper furnish to which filler was also added, increased the retention of the filler, the breaking length and the folding endurance. However the strength tests did not reach values of those obtained with similar furnish where the filler had been omitted. Experiments included the use of one starch for decreasing dyestuff losses in sized paper. Here best sheets resulted from treating the starch with ammonium persulphate, and sizing with a Manton wax. Belani. Pappen-Holzstaff Ztg. 46, No. 30, 354-5 (1939).

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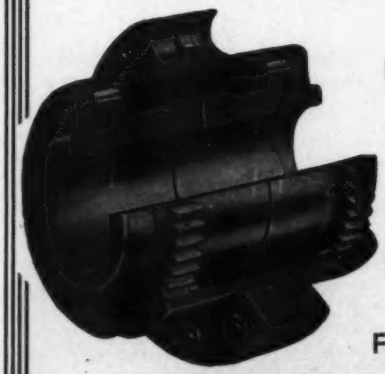

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PAPERMAKING PATENTS

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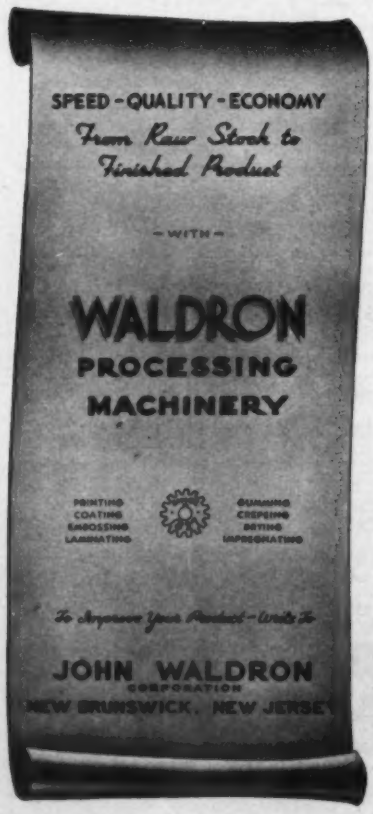
Method and Apparatus for Treating Paper Pulp

Patent No. 2,148,448. Miles Lowell Edwards, Portland, Oreg. Application January 20, 1936, Serial No. 59,953. 14 Claims. (Cl. 92—20). A method of treating paper pulp, including the step of delivering the pulp into a closed tank under a partial vacuum, striking the stock in said tank to increase its velocity, and causing it to be hurled against a target to produce a violent impact therewith. A method of treating fibrous pulp which consists of directing a flow of pulp, moving said pulp at relatively low velocity into contact with a high velocity member whereby small quantities of pulp are separated from said flow of pulp with sufficient force to disrupt the pulp fibres of each said small quantity.

Paper-Making Process

Patent No. 2,147,213. Donald K. Pattilloch, Neenah, Wis., assignor to Pattilloch Processes, Inc., Boston, Mass., a corporation of Massachusetts. Application May 27, 1937, Serial No. 144,975. 11 Claims. (Cl. 92—21). The improvement in incorporating starch in paper during its formation which comprises the steps of mixing gelatinized starch with paper fibers to form a starch-containing furnish, diluting the furnish to substantially paper-forming consistency, adding aluminum sulfate thereto while the furnish is flowing in a stream, and then similarly adding a sufficient amount of a precipitant from the group consisting of sodium aluminate, sodium metasilicate and sodium sesquisilicate thereto to form an aluminous precipitate by the substantially complete reaction of both added ingredients in the furnish but keeping the furnish on the acid side of neutrality, whereby the starch is precipitated upon the fibers, and forming a paper web therefrom.



Method of Manufacturing Reinforced Paper

Patent No. 2,148,490. William H. Millspaugh, Catawba Island, Ohio, assignor to Sandusky Foundry & Machine Company, Sandusky, Ohio, a corporation of Ohio. Application April 23, 1936, Serial No. 76,410. 2 Claims. (Cl. 92—41). The method of manufacturing reinforced paper comprising separately forming a plurality of webs of paper by vacuum formation on forming rolls, feeding therebetween a reinforced fabric, supplying coating material to said fabric during such feeding, applying the fabric while unconfined to the outer surface of one of the webs after emergence of such web from the stock supply and before such web leaves the forming roll, and heating and pressing the composite sheet.

High Wet Strength Paper and Process for Making Such Paper

Patent No. 2,146,281. Carl A. Anderson, Whitefield, N. H. Application January 29, 1936, Serial No. 61,332. 2 Claims. (Cl. 91—68). The process of making a high wet and dry strength water permeable flexible paper which comprises impregnating a paper with a glue containing glycerin, drying the impregnated sheet and air-hardening the glue, treating the surface only of the dried glue in the sheet with formaldehyde and removing excess formaldehyde and drying the sheet quickly to keep the formaldehyde from penetrating throughout the sheet and to render the glue at the surface of the sheet water insoluble and to retain the glue in the interior of the sheet water soluble.

Paper-Cutting Appliance

Patent No. 2,141,574. Heinrich Wamser, Chemnitz-Borna, Germany. Application September 27, 1937, Serial No. 165,980. In Germany December 23, 1936. 8 Claims. (Cl. 164—68). A self-adjusting paper feeding means in connection with transverse and diagonal cutters for paper-cutting machines, comprising in combination a cutter beam capable of being slued in a horizontal plane, cutters on the beam, conveyor bands for supporting and feeding the paper to the cutter beam and for conveying the cut-off pieces away from the same, guide rollers for guiding the conveyor bands approximately at the height of the cutters on the beam and guide rollers at the height of the lower part of the cutter beam for guiding the conveyor bands round under the cutter of the beam and bearings for all these guide rollers, the bearings for the guide rollers situated in the immediate neighborhood of the cutter beam being independently slidable in the longitudinal direction of the conveyer bands on guide rails while remaining at a constant distance apart in the transverse direction of the conveyer bands.

Method of Converting Nonaqueous Pulps

Patent No. 2,149,281. Emile C. De Stubner, Charleston, W. Va. Application December 28, 1935, Serial No. 56,585. 2 Claims. (Cl. 252—6). A method of dispersing finely divided solids in a selected organic dispersion vehicle in a substantially water free condition which consists in forming a preliminary non-aqueous pulp of finely divided solids in a substantially water free organic liquid pulping medium for said solids, said pulping medium being selected particularly for its compatibility with the selected dispersion vehicle and chosen from the group of such pulping mediums which have a greater wetting action on the solids than does said selected dispersion vehicle, and which are directly miscible with the said selected dispersion vehicle and which are relatively more volatile and have a relatively lower surface tension than said dispersion vehicle, then adding said preliminary suspension directly to the selected dispersion vehicle and thereafter simultaneously distilling off the pulping medium and kneading the mass whereby the dispersion vehicle replaces the pulping medium and the finely divided solids are uniformly distributed throughout said vehicle.

Apparatus for Treating Paper Pulp and the Like

Patent No. 2,138,715. Kristen Andreas Thorsen, Grenoble, Isere, France, assignor to Paper & Industrial Appliances Inc., New York, N. Y., a corporation of New York. Application April 24, 1936, Serial No. 76,270. In France May 6, 1935. 7 Claims. (Cl. 92—20). Apparatus of the class described, comprising a hollow rotating cylinder having a foraminous area for a substantial portion of its length, a plurality of rotating crushing or pressing rolls disposed within said cylinder and extending longitudinally of the cylinder, said rolls being arranged cooperatively with one another to receive material between them, means for feeding material to said cylinder, a stationary scraper extending longitudinally of said cylinder above said rolls and arranged to scrape the material off the inner wall of said cylinder to cause the material to fall between said rolls, and a stationary deflecting means extending longitudinally of said cylinder adjacent said scraper so as to re-

Season's Greetings:

CHRISTMAS this year finds all of us in America particularly fortunate, — at peace with our neighbors; at work with plenty to do; blessed among our friends.

. . . To You All, the Makers of TENAX FELTS extend these greetings:

A Merry Christmas and a Happy and Prosperous New Year

LOCKPORT FELT COMPANY

NEWFANE, N. Y., U. S. A.

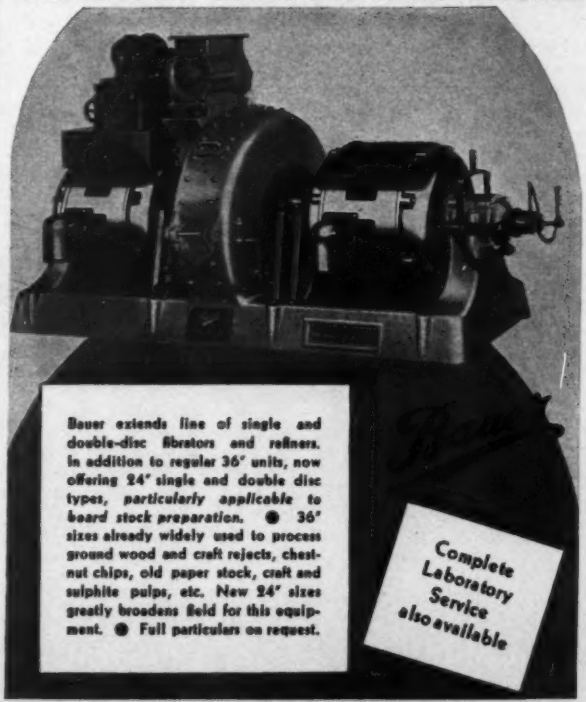
KALAMAZOO GLAZED TILE TANKS

Their bright glistening surface can be kept absolutely clean by a few minutes wash down with a hose—no slime, no concrete chips. Impervious to the action of ordinary stock fluids.

Manufacturers of wood tanks for 60 years.

KALAMAZOO TANK & SILO CO.
KALAMAZOO MICHIGAN

BAUER EXPANDS LINE



Bauer extends line of single and double-disc fibrators and refiners. In addition to regular 36" units, now offering 24" single and double disc types, *particularly applicable to board stock preparation.* ● 36" sizes already widely used to process ground wood and craft rejects, chestnut chips, old paper stock, craft and sulphite pulps, etc. New 24" sizes greatly broadens field for this equipment. ● Full particulars on request.

Complete Laboratory Service also available

THE BAUER BROTHERS CO.

SPRINGFIELD, OHIO

ceive the scraped-off material and adapted to move the material longitudinally of the cylinder as it is repeatedly scraped off the cylinder wall and passed between said rolls.

Cutting Machine

Patent No. 2,149,822. Gustave A. Ungar, Pelham Manor, N. Y., assignor to S. & S. Corrugated Paper Machinery Co., Inc., Brooklyn, N. Y., a corporation of New York. Application October 21, 1935, Serial No. 45,858. 22 Claims. (Cl. 164—68). In a device for cutting strip material in predetermined lengths; cutting mechanism operable in cycles; power means for feeding said strip material at constant speed past said cutting mechanism; a driving connection from said power means to said cutting mechanism; and a timing means exterior of said driving connection for varying the period of the cycle at which said driving connection drives said cutting mechanism and for causing said driving power to drive said cutting mechanism in synchronous speed with said strip material during the cutting interval; and means for compensating for any tendency to a slight difference between the speed of the cutting mechanism and strip material at the period of cutting.

Apparatus for Making Laminated Wrapping Papers

Patent No. 2,136,739. Dallas Grant, Windsor Mills, Quebec, Canada, assignor to Canada Paper Company, Montreal, Quebec, Canada, a corporation of Canada. Application August 11, 1937, Serial No. 158,549. In Canada June 24, 1937. 4 Claims. (Cl. 154—37). Apparatus for use in the manufacture of laminated paper products comprising means for applying a coating of asphalt to one side of a travelling web of paper, a cylindrical rod over which the coated side of the web travels as it leaves the coating means, means for continuously rotating said rod in a direction opposite to the travel of said web, means for raising and lowering the rod to regulate the thickness of the coating left on the web as it passes beyond said rod, means for removing asphalt from the coating-engaging surface of said rod and means for pressing a second travelling web of paper against the coated side of the first web after the latter has passed over said rod.

Head Box for Fourdrinier Machines

Patent No. 2,148,613. Orcutt W. Frost, Cloquet, Minn., assignor to Wood Conversion Company, Cloquet, Minn., a corporation of Delaware. Application March 23, 1936, Serial No. 70,332. 2 Claims. (Cl. 92—44). A head-box for a Fourdrinier type of fiber-felting machine comprising a constant level supply device for stock furnish, means providing a spillway for discharging stock from said supply device in the direction of the Fourdrinier wire movement, stop means at the bottom of said spillway, a flow shelf leading under the spillway for reversing flow of said stock backwardly on said shelf, said shelf being arranged to discharge the stock for downward motion onto the Fourdrinier wire, and dam in advance of the stock leaving said shelf in sealed relation with Fourdrinier wire, whereby to form a pool area on the wire for receiving the stock from said shelf.

Vacuum Mechanism for Paper Making Machines

Patent No. 2,147,877. Arthur E. Broughton, Glens Falls, N. Y. Application March 25, 1936, Serial No. 70,846. 4 Claims. (Cl. 92—51). The combination with a plurality of paper making machines each having a group of first suction heads, an air conduit receiving air from said first suction heads, a second suction head and means for maintaining the second suction head under vacuum pressure, of a single vacuum pump for use with the groups of first suction heads of the plurality of machines, said pump receiving from all said air conduits, a valve for each machine in each air conduit and valve control means for each machine operated by the air pressure in the second suction head of that machine for opening and closing its valve, each valve control means acting to close its valve as the air pressure in the second suction head of the particular machine rises above a certain pressure and acting to open its valve as the air pressure in its second suction head of the particular machine falls below the certain pressure.

The Paper Industry Safety Contest

July 1, 1939 to June 30, 1940

Out of 181 mills reporting for October, 37 have perfect record

PERFECT SCORES

Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
Price Brothers & Co., Ltd.	Kenogami, P. Q.	Canada
The Gardner-Richardson Co.	Lockland	Ohio
*Oswego Falls Corporation	Fulton	New York
GROUP B		
P. H. Glatfelter Co.	Spring Grove	Pennsylvania
Thilmany Pulp & Paper Co.	Upper Mill	Kaukauna, Wis.
Quebec North Shore Paper Co.	Baie Comeau, P. Q.	Canada
GROUP C		
Southern Kraft Corporation	Continental Div.	York Haven, Pa.
Escanaba Paper Company	Escanaba	Michigan
The Eddy Paper Corp.	White Pigeon	Michigan
Strathmore Paper Co.	Woronoco	Massachusetts
Bedford Pulp & Paper Co.	Big Island	Virginia
*Central Fibre Products Co.	Quincy	Illinois
American Writing Paper Corp.	Linden Div.	Holyoke, Mass.
*The Mead Corporation	The Harriman Co.	Harriman, Tenn.
The Mead Corporation	Sylva Paperboard Co.	Sylva, N. C.
*Donohue Brothers Ltd.	La Malbaie, P. Q.	Canada
GROUP D		
Bird & Son, Inc.	Phillipsdale	Rhode Island
Crown Zellerbach Corporation	Crown Willamette Paper Co. Div.	Lebanon, Ore.
American Writing Paper Corp.	Nonotuck Div.	Holyoke, Mass.
American Asphalt Roof Corp.	Kansas City	Missouri
The Mead Corporation	Nashville	Tennessee
International Paper Co.	Livermore No. 11	Livermore Falls, Me.
*United States Gypsum Company	North Kansas City	Missouri
Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardiner, Me.
Spaulding Fibre Co., Inc.	Milton	New Hampshire
Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Me.
International Paper Co.	Riley No. 23	Riley, Me.
*Central Fibre Products Co.	Vincennes	Indiana
*Central Fibre Products Co.	Mt. Carmel	Illinois
Spaulding Fibre Co., Inc.	Hayes	New Hampshire

Division II—Paper and Board Re-Manufacturing

Gaylord Container Corp.	St. Louis	Missouri
Union Bag & Paper Corp.	Chicago Bag Factory	Chicago, Ill.
The Container Company	Van Wert	Ohio
Fort Orange Paper Co.	Castleton-on-Hudson	New York
Kimberly-Clark Corp.	Atlas Mill	Appleton, Wis.
Bird & Son, Inc.	Shreveport	Louisiana
Bay West Paper Co.	Green Bay	Wisconsin

*October report missing—covers three months only.

◆

Sulphate Pulp for Rayon

In the production of viscose from sulphate pulp, difficulties in the filtration may be met by bleaching the pulp with chlorine and a subsequent treatment with 11-12% NaOH at 115-20 deg. C. for about 1.5 to 2 hours. The pentosans and hemicelluloses are thus reduced, and the resulting viscose is filtered readily, giving a product which is comparable with that derived from sulphite pulp. A. G. Laube. Tsentral Nauch-Issledovatel. Inst. Bumazh. Prom. Materialy (1938), No. 26-7, 156-63; through C. A. 33, 7099 (1939).

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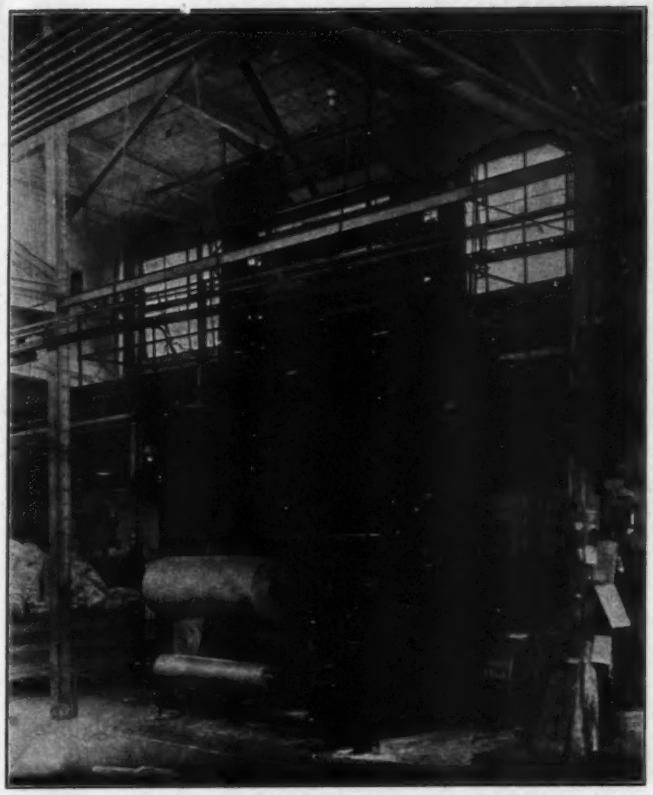
▶▶▶ *Robert C. Brown,* well known in the paper industry because of his association with the Kimberly-Clark Corporation during the past twenty-three years, is now western manager of the Tympan Division of the Cromwell Paper Company, Chicago. He will be in charge of sales in all states west of the Mississippi River.



SPEED PRODUCTION; Reduce Costs With Norwood Calenders

Norwood Calenders will step up the efficiency of your finishing room by eliminating costly delays. Check your calenders today . . . if you are getting too much broke or your operating cost is too high, then write today and discuss your problems with Norwood's engineers. Ask Norwood what they can do about overhauling or adding some new feature that will bring your calenders up to date..

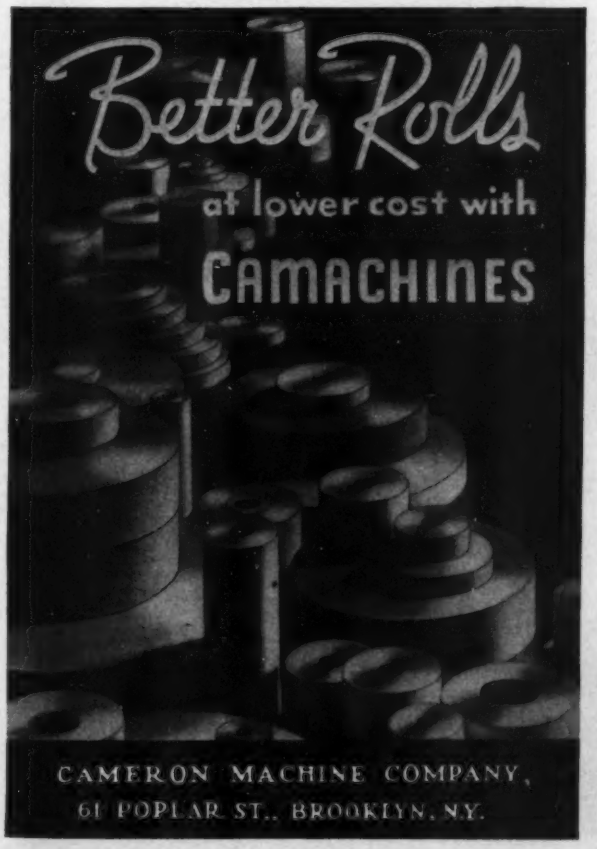
Perhaps a new power-saving drive, a hydraulically controlled pressure device or the new adjustable intermediate roll journal boxes will be just the thing to speed up your production. And if you need new machines you can depend on Norwood to give you better quality, faster production and lower operating cost.

With 46 years of expe ience, research and cooperation with leading paper mill men throughout the country, Norwood is capable of helping you solve your finishing room problems. Write today . . . for there is some improvement that can be added that will g eatly increase your production at a relatively small cost.

Write today about your finishing problems. We will help you.

THE NORWOOD ENGINEERING CO.
16 No. Maple St., Florence, Mass.

A GOOD START AND A GOOD FINISH WITH
NORWOOD
DEPENDABLE WATER FILTERS AND PAPER FINISHING MACHINERY



READ A LEADER

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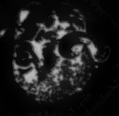
THE PAPER INDUSTRY and PAPER WORLD

SWENSON
EVAPORATORS & FILTERS for Pulp Mills
SWENSON EVAPORATOR COMPANY
15653 Lathrop Avenue
Harvey (Chicago Suburb), Ill.

MORRIS
CENTRIFUGAL PUMPS
Write for interesting and useful bulletin on Non-Clogging Pumps for handling pulp, and centrifugal pumps for other mill processes and services.
MORRIS MACHINE WORKS, Baldwinsville, N. Y.

THE TRADE-MARK OF GOOD FELTS



The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

New Catalogues and Publications

Acme Steel Co., Chicago, Ill.—Now available from this company is an attractive, recently-released booklet which describes ways for assuring safe arrival of shipments at foreign destinations and ways to prevent pilferage as well as damage claims by use of the company's various types of steel strapping, stitching wire, etc. The 24-page release also illustrates and describes an extensive array of strapping tools and accessories in the Acme line.

Allen-Sherman-Hoff Co., Philadelphia, Pa.—This company's new catalogue (No. 639) on "hydrojet" ash handling systems, has been released for circulation. The 35-page publication, replete with installation photographs, shows the various applications of the company's ash handling systems. Much informative data is to be found in the release.

American Leather Belting Assn., New York, N. Y.—Plant engineers, maintenance men and superintendents will find the new data handbook on automatic tension control short-center pivoted-motor leather belt drives, just published by this company, a valuable addition to their knowledge of individual machine drives and drives from motors to lineshafts. The book is filled with informative data pointing out the advantages of this type of drive with explanations of the tests to determine comparative efficiencies. The book contains drive selection tables with all necessary specifications and is replete with installation photographs. Of special interest is the spread showing illustrations of the drives in paper mills. The book is the result of the co-operative efforts of forty-six manufacturers of leather belting and motor bases.

Armstrong Machine Works, Three Rivers, Mich.—A new bulletin on this company's humidifiers which illustrates, in addition to other equipment, the company's new K-2A humidifier, has been released lately. The booklet illustrates several installation photos and in addition includes a handy table by which it is possible to ascertain the numbers and types of the company's humidifiers one's own particular plant needs.

Brown Instrument Co., Philadelphia, Pa.—A very interesting booklet on boiler room instruments has been issued recently by this company. The purpose of the book is to provide data from which a suitable plan of instrument equipment may be easily worked out for any steam plant. Tables and written matter conform to that purpose and for that reason the booklet is valuable as a reference. Good use of illustrations, including photographs and blueprints, add to the value of the release.

Buffalo Forge Co., Buffalo, N. Y.—A new bulletin (3136) describing and illustrating the company's new "L" Breezo fan for industrial use has been published recently. The bulletin shows typical arrangements of the product and gives specifications and prices. It lists uses of the fan as wherever there is an excess of moisture, heat, dust or corrosive fumes to be removed. The motor is outside the airstream.

Carbide and Carbon Chemicals Corp. (Union Carbide and Carbon Corp.), New York, N. Y.—An extremely attractive booklet on "Fine Chemicals" has just been published by this company. The release contains explanations of compounds recently added to those already industrially available, including higher alcohols, ethers and glycols, higher ketones, aldehydes, organic esters, acids and anhydrides, amines, and "terfitol" penetrants. Complete tables of physical properties are included in the new booklet, in addition to superior photography work showing facilities of the company.

Chemical Publishing Co., Inc., New York, N. Y.—A new catalogue of technical books including texts on chemistry, physics, mathematics, medicine, metallurgy, machinery, engineering, technical dictionaries, etc., has been published recently by this firm.

Ingersoll-Rand Co., Phillipsburg, N. J.—A new line of industrial compressors and vacuum pumps in sizes of from three-quarter through 5 hp. is shown in a new catalogue recently issued by this concern. The 32-page catalogue is well illustrated and contains considerable data relative to the company's products. The catalogue contains both installation and shop views of the machines, together with complete operating and physical characteristics of each.

Nichols Engineering and Research Corp., New York, N. Y.—A very well written and interesting bulletin (209) on this company's Vortrap classifier for the removal of grit, sand, scale, sawdust, and general dirt from papermaking stock, has been published recently. The booklet explains the development of the classifier and also gives a very complete description of the unit itself and its operation.

Paper and Industrial Appliances, Inc., New York, N. Y.—Of interest to pulp and paper technicians is a new release which describes and illustrates the Laurel fiber classifier. The folder contains many interesting points relative to use, construction and operation of the apparatus.

Precision Scientific Co., Chicago, Ill.—Bulletin 305, a new release just issued by this company, offers a practical discussion on the subject of heat transfer as applied to constant temperature laboratory equipment. Included in this well-illustrated release are a brief review of heat transfer principles and an outline of technical considerations affecting the rate of heat transfer, variations in quantity of heat required, attributes of peak performance and various aspects of efficiency.

R. W. Rhoades Metaline Co., Inc., Long Island City, N. Y.—A complete new catalogue describing the company's oilless bronze bearings—their history and various types manufactured—has been issued recently. New uses of the company's products are described and illustrated. Included in the release are descriptions of how the bearings function in equipment that must avoid oil drippage, when located in inaccessible places and examples of heavy duty and under water service. Tables of sizes and specifications are included.

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.—A new catalogue (1125C) on industrial thermometers has just been put out by this company. The book contains 24 pages of conveniently arranged listings of the complete line of TAG industrial thermometers. The book is extremely well illustrated and contains much pertinent information about the construction of the instruments. Specification data are given.

Whitney Chain and Mfg. Co., Hartford, Conn.—Silent chains and sprockets is the subject of a new catalogue recently put out by this company. The bulletin, punched for loose-leaf filing, contains interesting illustrations of the construction of the chains and sprockets and well-written literature explaining all features of the product. Installation photographs are numerous throughout as are dimensional tables. Price lists are included in this ably-presented, 64-page offering.

T. B. Wood's Sons Co., Chambersburg, Pa.—This company has just published a very interesting and attractive new catalogue (82) covering its line of power transmission machinery. The catalogue is 160 pages in length and contains extensive data on specifications in addition to price lists. All products, including base plates, bearings, belt shifts, clutches, couplings, keys, pillow blocks, pulleys, sheaves, etc., are described completely. In addition, there are several handy tables for general use, including weights and measures, circumferences, weights of metals, etc. This book should be in every industrial library.

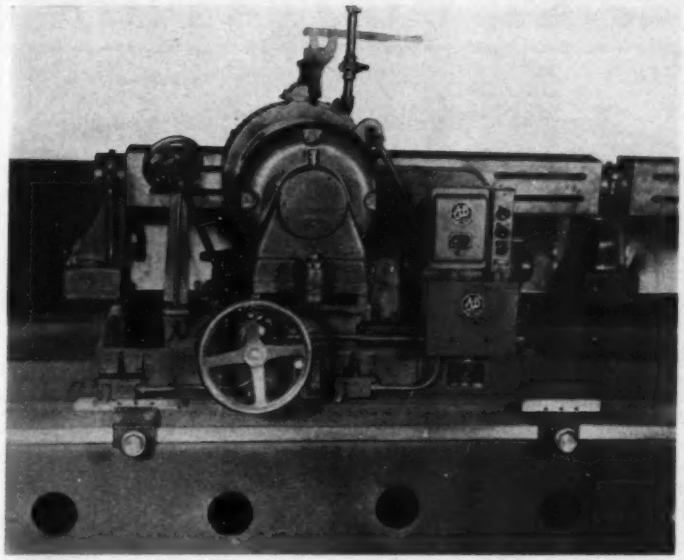
BOOKS

Chemipulp Sulphite Mill Operation—This handbook, prepared expressly for the sulphite mill operator, contains a historical sketch covering the development of the sulphite pulping process as well as discusses to some length such subjects as wood preparation, acid making and cooking, and the Chemipulp Hot Acid Cooking and Recovery System. In addition, about one-half of the book is devoted to tables, charts and graphs of great practical usefulness. It is a work of about 200 pages, attractively designed not only as to page make-up, but also as to page size and binding. Published by Chemipulp Process Inc., Watertown, N. Y., the volume can be obtained from A. M. Phillips, Buck Terminal Bldg., Watertown, N. Y., its printer.

Holzchemie (The Chemistry of Wood)—In this second and completely revised edition, the author, Erik Hagglund, has maintained the high standards of his original monograph published ten years ago. He has covered the following subjects: woody tissue, physical properties of wood, components of wood and their properties (including an excellent resumé of the work on constitution of cellulose and lignin), saccharification of wood, the chemistry of the sulphite and soda processes, other delignifications, wood distillation, chemical wood utilization, behavior of wood on storage and towards certain reagents, and the biological degradation of wood. Some important omissions occur. For example Stamm's work is slighted and Harlow's work on the cell wall is overlooked. But despite this it is amazing that one chemist was able to handle such a wealth of material with such rare critical ability. One of the features of the work is that the author has drawn so largely on the researches from his own laboratory, and that in some few instances the data have hitherto been unpublished. The book is indispensible to all interested in chemical wood utilization. Holzchemie. pp 397. Erik Hagglund (Stockholm) published by Akademische Verlagsgesellschaft. Leipzig (1939).

How to Buy, Sell, and Burn Coal—A paper-covered, pocket-size publication of about 100 pages, this volume treats non-technically what the purchaser should know about coal, the selection of coal, coal burning equipment, service work, troubles and remedies, boiler tests, and smoke abatement. The book is priced at $1.00 a copy by Thomas A. Marsh, its author, 5625 Kenwood Ave., Chicago.

Standard Chemical and Technical Dictionary—This dictionary is a condensed technical word book, containing over 25,000 definitions. It has been prepared by H. Bennett to cover industrial products, pure chemicals and trade names, abbreviations and contractions, as well as symbols used in mathematics and chemistry. The book contains more than 650 pages. All material is arranged to permit easy reference. Trade names and proper names are capitalized. Data for chemical compounds are presented in an orderly arrangement. All temperatures are in degrees Centigrade. The book, bound in red cloth cover, is priced at $10.00 a copy by Chemical Publishing Company, Inc., 148 Lafayette Street, New York, N. Y., the publisher.



Automatic

KNIFE GRINDER

For Doctor Blades, Paper Knives, Chipper Knives, and all flat, bevel or concave grinding

Precision construction with extra strength working parts not only provide the accuracy, durability and production which secures the most economical operation in the actual doing of the work, but in addition save time, knife and grinding wheel expense.

The above illustration indicates the excess sturdiness of the latest Covel-Hanchett traveling wheel grinder, which with preloaded, precision ball bearings, automatic protected lubrication, and convenient, accurate controls, positively reduces grinding costs and knife up-keep expense. We prove it. You benefit.

COVEL-HANCHETT CO.

BIG RAPIDS, MICHIGAN, U. S. A.

NORMAN B. SCOTT
WALTER S. HODGES
FRANK B. EILERS
MES CASPARIS
MEET THE MEN WHO SELL ORR FELTS
If you have a felt problem, here are the men to help you solve it.
Mr. Eilers, dean of the "force," has been contacting the mills for many years. The same holds true of Messrs. Purdy, Scott, Hodges and Casparis. If these men have cooperated on one felt problem, they have cooperated on a thousand. Why not take advantage of their broad experience?
And remember this—the superior water removal qualities and longer wear of Orr Felts account for the Orr plant being the largest felt mill in the world.
THE ORR FELT AND BLANKET COMPANY
Piqua, Ohio
ORR FELTS

CURRENT MARKET QUOTATIONS

(Owing to Unsettled Market Conditions All Prices Are Nominal)

RAGS (Domestic)
f. o. b. New York City

NEW RAGS

	per cwt.
Blue Overalls	5.25 to 5.50
Corduroy	2.75 to 3.00
Cottons—	
Washables, No. 1	2.25 to 2.50
Fancy Percales	3.75 to 4.00
New Soft Blacks	4.00 to 4.25
New Light Seconds	2.00 to 2.25
New Dark Seconds	1.85 to 2.00
Khaki Cuttings—	
Mixed	3.25 to 3.50
O. D.	3.75 to 4.00
New Canvas	8.25 to 8.75
New Mixed Blacks	2.50 to 2.75
Shirt Cuttings—	
New White No. 1	7.75 to 8.00
Silesias No. 1	5.00 to 5.25
New Unbleached	7.75 to 8.00
Fancy	2.50 to 2.75

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

	per cwt.
Roofing—	
No. 1	1.50 to 1.55
No. 2	1.30 to 1.35
No. 3	1.20 to 1.25
Twos and Blues—	
Repacked	2.00 to 2.25
Thirds and Blues—	
Repacked	1.80 to 2.00
Miscellaneous	1.65 to 1.75
White, No. 1—	
Repacked	3.00 to 3.25
Miscellaneous	2.75 to 3.00
White, No. 2—	
Repacked	2.50 to 2.75
Miscellaneous	2.00 to 2.25

RAGS (Foreign)
ex dock New York City

NEW RAGS — per cwt. — Nominal

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints

RAGS (Foreign)
ex dock New York City

OLD RAGS — per cwt. — Nominal

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints
Med. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shopperies

ROPE and BAGGING
f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	2.25 to 2.50
Domestic	2.25 to 2.50
Wool Tares—	
Light	2.15 to 2.25
Heavy	2.25 to 2.40
No. 1 Scrap Bagging	2.10 to 2.25
Manila Rope—	
Foreign	4.25 to 4.50
Domestic	4.00 to 4.25
New Burlap Cuttings	3.50 to 3.75
Jute Threads—	
Foreign	3.75 to 4.00
Domestic	3.50 to 3.75
Strings—	
Sisal	2.25 to 2.50
Soft jute	3.25 to 3.50
Mixed	1.00 to 1.25

WASTE PAPER
f. o. b. New York City

Shavings—	per cwt.
White Envp. Cuttings	2.75 to 2.90
Ord. Hard White No. 1	2.25 to 2.50
Ord. Soft White No. 1	2.00 to 2.25
Soft White, Extra	2.50 to 2.65
Flat Stock—	
Stitchless	1.00 to 1.05
Overissue Mags	.95 to 1.00
Solid Flat Book	.85 to .90
Crumpled No. 1	.70 to .75
Solid Ledger Books	1.75 to 1.90
Ledger Stock—	
White	1.50 to 1.65
Colored	1.05 to 1.15
New B. B. Chips	.55 to .60
Manilas—	
New Env. Cuts	1.90 to 2.00
New Cuttings	1.50 to 1.60
Sulphite Wrappers	.55 to .60
No. 1 Old Kraft	1.00 to 1.10
News—	
No. 1 Wh. News Cuttings	1.80 to 1.90
Strictly Overissue	.85 to .90
Strictly Folded	.60 to .65
No. 1 Mixed Paper	.52½ to .55

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt	3.40 –
Ground, cwt	3.15 –
Powdered, cwt	3.55 –
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 45.00
Dry, barrels, pound	.0350 to .0340
Bleaching Powder—	
Drums, cwt	2.00 to 3.00
Casein (Domestic Standard)—	
20-30 mesh (bags), lb	18.00 –
80-100 mesh (bags), lb	18.50 –
Argentine, lb	14.50 to 15.00
China Clay—	
Domestic Filler	
Bulk (mine) ton	7.50 to 15.00
Domestic Coating	
Bulk (mine) ton	11.00 to 22.00
Imported (ship side)	
Bulk (lump) ton	30.00 to 35.00
Chlorine—	
Tank cars (wks) cwt	1.75 to 1.90
Gelatine (silicin), lb	.53 to .55
Glyc. (C.P.) drums, lb	.1250 to .1300
Litharge, powd., bbl., lb	.08 –
Rosin (Gum)—	
New York, 280 lb. barrel	
E, per bbl	6.40
F, per bbl	6.50
G, per bbl	6.75
WW, per bbl	7.70
Rosin (Wood), per bbl., carlots	4.00 to 6.65
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 19.00
Imp. bulk on dock—	
(Atl. ports) ton	
Soda Ash—	
Bulk (works) cwt	.90 to .95
Paper Bags, cwt	1.05 to 1.35
Barrels, cwt	1.05 to 1.35
Soda (Caustic)—Ammonia,	
Solid, drums, cwt	2.30 –
Ground and flake, drums, cwt	2.75 –
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt	1.65 to 2.00
40 deg., 35 gal. drums, (works) cwt	.80 to 1.20
Starch—	
Pearl, 140 lb. bags, cwt	2.45 –
Pearl, barrels, cwt	2.70 –
Paper (Sp.) bags, cwt	2.55 –
barrels, cwt	2.80 –
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 18.00
Imp. bulk, ton	
Titanium Dioxide—	
Barium Pig., bbls., lb	.05¼ to .05½
Calcium Pig., bbls., lb	.05¼ to .05½
Zinc Sulphide, bbls., lb	.07½ to .07¾

CHEMICAL PULP
(Air-dry ton)

Soda (Dom.) del'd. mill—	per cwt.
Bleached, 1st quarter	2.90 –
Sulphate (Dom.) f. o. b. mill—	
Bleached	3.00 to 3.25
Kraft No. 1	2.00 to 2.50
Kraft, Southern, del	1.90 to 2.15
Sulphate (Imp.) on dock—	
Bleached	3.00 to 3.50
Kraft No. 1	2.00 to 2.15
Kraft No. 2	1.85 to 2.00
Sulphite (Dom. & For.)	
On dock—	
Prime bleached	2.80 to 3.00
Prime easy bleach	2.50 to 2.75
Prime strong unbl	2.25 to 2.50

MECHANICAL PULP
(Air-dry ton)

	per ton
No. 1 Dom. & Can. (f. o. b. mill)	30.00 to 33.00
No. 1 Imp. (On dock)—	
Moist	38.00 to 42.00
Dry	38.00 to 42.00

PAPER
f. o. b. New York City

Boards—	per ton
Binders	76.00 to 82.00
Chip	45.00 –
Chip, sgl. mla. lined	57.50 to 60.00
Coated, white patent	
.016	75.00 –
.020 and heavier	70.00 –
Kraft liner	55.00 –
News	45.00 –
Book (cased)	**per cwt.**
No. 1 Glossy Coat	11.50 to 13.50
No. 2 Glossy Coat	10.35 to 11.75
No. 3 Glossy Coat	9.55 to 11.00
No. 4 Glossy Coat	9.15 to 10.50
No. 2 Offset	7.70 to 9.00
A Grade M. F.	6.15 to 6.90
A Grade Super	6.40 to 7.15
B Grade M. F.	5.70 to 6.45
B Grade Super	5.95 to 6.70
B S. & S. C. Litho	6.20 to 6.95
B M. F. Litho	5.95 to 6.70
Ivory & India	.50 cwt. extra
Bonds (Rag Content)—	
100% Rag	per cwt.
Ext. No. 1	30.10 to 46.00
100% Rag	31.05 to 36.50
85% Rag	
75% Rag	23.60 to 27.75
65% Rag	20.50 to 25.00
50% Rag	17.55 to 21.50
25% Rag	14.65 to 17.75
Regular Colors	1.00 cwt. extra
Bonds (Sulphite)—	**per cwt.**
No. 1	8.95 to 11.00
No. 2	8.05 to 9.75
No. 3	7.60 to 9.25
No. 4	7.30 to 9.00
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	**per cwt.**
Embossed (25 lb. up)	12.50 –
Bleached (25 lb. up)	11.50 –
Unbleach. (25 lb. up)	10.00 –
Greaseproof—	
Bleach. (25 lb. up)	10.00 –
Unbleach. (25 lb. up)	9.00 –
Ledgers (Rag Content)—	
100% Rag	per cwt.
Ext. No. 1	40.25 to 47.25
100% Rag	32.20 to 37.75
85% Rag	29.90 to 35.00
75% Rag	24.75 to 29.00
65% Rag	21.65 to 26.25
50% Rag	18.70 to 22.75
25% Rag	15.80 to 19.25
Regular Colors	1.00 cwt. extra
Ledgers (Sulphite)—	**per cwt.**
No. 1	10.10 to 12.25
No. 2	9.25 to 11.25
No. 3	8.50 to 10.75
No. 4	8.50 to 10.25
News—	**per ton**
Rolls (Contract)	50.00 –
Rolls (Spot)	(nominal)
Sheets	58.00 –
Tissues (Carlots)—	**per ream**
White, No. 1	.87½ –
White, No. 2	.67½ –
Anti-Tarnish M. G.	.75 –
Colored	.87½ –
Kraft	.72½ –
Manila	.65 –
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.41 –
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.43½ –
Toilet, Bleached (M shts.) per cs	5.80 –
Toilet, Unbleached (M shts.) per cs	3.35 –
Towels—	**per case**
Bleached	3.10 to 3.65
Unbleached	1.85 to 3.30
Wrappings (Kraft)—	**per cwt.**
Extra Quality	5.00 to 5.50
Super-Standard	4.50 to 5.00
Northern Standard	4.25 to 4.50
Southern Standard	4.00 to 4.25
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	
M.F. & M.G. Waxing, 20 lb. (Carloads only)	per cwt. 6.00 –
(10,000 lbs.)	6.25 –
Drug wrapp. 35 lb	6.25 –
Unbleached Papers—	
Com. Grd. Butch. 40 lb	4.50 –
No. 1 Butchers	4.75 –
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	5.00 –
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.75 –
Steam Finish, 50 lb	4.12½ –
Water Finish, 40 lb	4.50 –
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	5.00 –
Envp. Mla., Sub. 16-28 (No. 2)	4.75 –
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	5.25 –
No. 2	5.00 –
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-25 lb	5.50 –
Grade B-25 lb	5.00 –